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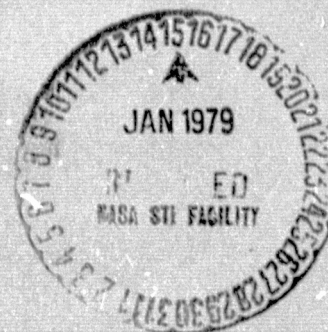
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MEASUREMENTS OF INLET FLOW DISTORTIONS IN
AN AXIAL FLOW FAN (6- AND 9-BLADED ROTOR)

Barr, L. C.

Technical Memorandum
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Subject: Measurements of Inlet Flow Distortions in an Axial Flow Fan (6- and 9-Bladed Rotor)

References: See page 18.

Abstract: This memorandum presents the large quantity of experimental data obtained in an investigation of inlet flow distortions in an axial flow fan. The purpose of the study was to determine the effects of design and operating variables and the type of distortion on the response of an axial flow turbomachinery rotor. This study also provided a broad data base which can be used in future research and in the design community. Reference [1] includes the background information and the overall trends observed in the distortion attenuation and unsteady total pressure losses. This memorandum merely documents the complete set of experimental data without discussing the results or conclusions. A six-bladed zero steady lift rotor and a nine-bladed cambered rotor were employed in the experimental program. The steady performance and the distortion measurements made with these two test rotors are included in this report.

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Nomenclature

Symbol

c	blade chord length
$C_{pt_{loss}}$	total pressure loss coefficient
ΔP_T	change in total pressure, $P_{T_{exit}} - P_{T_{inlet}}$
i	incidence angle
P_{atm}	atmospheric pressure
P_s	static pressure
P_T	total pressure
$P_{T_{LOSS}}$	total pressure loss
s/c	space-to-chord ratio
u	blade speed at the mean radius
V_x	axial component of velocity
V_θ	circumferential component of velocity
V_R	radial component of velocity
$V_{x_{avg}}$	circumferential average axial velocity measured at location 1-D
ξ	stagger angle
ρ	mass density
ϕ	flow coefficient, V_x/U
ψ	pressure rise coefficient, $(P_{T_{exit}} - P_{T_{inlet}}) / \frac{1}{2} \rho U^2$

Subscripts

exit	refers to the exit of the rotor
inlet	refers to the inlet of the rotor

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Introduction

In dealing with the problem of distorted inlet flows, designers of axial flow fans and compressors require a knowledge of the fluctuating forces on the blades, the attenuation of the distortion through each blade row, the loss in performance, and any reduction in stability caused by the distortion, as a function of the operating and geometrical design variables of the machine which the designer can control. Theoretical predictions are valuable in understanding distortion phenomenon and also in making some design decisions; however, many theoretical methods require the steady performance of the compressor or blade row to be known. Since the performance characteristics are determined by a number of geometric design parameters, theoretical methods give very little insight into the selection of the proper design parameters to be used in the design process.

To aid in the continual development of theoretical design techniques and to help bridge the gap between present day theories and the needs of designers, experimental data of a fundamental nature demonstrating the effect of geometric and operating variables are needed. The objective of this study was to provide some of the necessary fundamental data by examining the unsteady response of a turbomachinery rotor to time-mean spatial variations in the rotor inlet flow as a function of various design and operating variables such as rotor solidity, stagger angle, steady load, and rotor-stator spacing.

The purpose of this report is to document the large amount of experimental data obtained in this study. From the data, the distortion attenuation and unsteady losses have been analyzed and are presented in Reference [1]. This information should provide a basis for designing

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compressors and fans with improved performance when operated in an inlet distortion and also provide guidance for conducting future research in the areas of distortion attenuation and unsteady losses. Another objective of this investigation was to provide a data base for use in future studies. For example, the data can be used to evaluate new theories or to modify existing prediction techniques. No discussion of the data is included in this report nor are any conclusions drawn, since this was done in Reference [1].

The approach taken to measure the response of the blade row was to make detailed circumferential surveys of a distorted inlet flow upstream and downstream of two test rotors. The first rotor used in the study was a zero steady lift rotor which had six uncambered blades ($s/c=1.353$ at its mean radius) and was assembled with stagger angles of 35, 45, and 55 degrees at the mean radius to investigate the effect of stagger angle on the unsteady rotor response. To study the effect of rotor solidity (chord-to-space ratio), these data were compared to the data obtained by Yocum in Reference [2] using a twelve-bladed rotor ($s/c=0.676$). The second test rotor used in the experiments was a nine-bladed cambered rotor ($s/c=0.90$) with a fixed stagger angle of 50 degrees at the mean radius. To study the effect of rotor-stator spacing, eight cambered stator blades were installed in the facility and measurements were made at the mean radius with the stator row located one-half and two blade chord lengths downstream of the rotor trailing edge. Also, the effect of radial variations in the flow field was examined by making circumferential surveys at four spanwise locations other than the mean radius of the blade. For both rotors, tests were conducted at different values of incidence angle to determine the effect of mean blade loading. A total of six

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different distortion screens were tested; the screens used were one-, two-, four-, and six-cycle sinusoidal distortions and 90 and 180 degree square distortions. Five-hole probes in the non-nulling mode were used to conduct the circumferential flow surveys. These probes, through their calibration curves, yield the total pressure, static pressure, and the three velocity components at each measurement location. The surveys were made in two-degree increments.

Since only typical distortion data are presented in Reference [1], all of the distortion data are documented in this report. The steady performance measurements of both rotors are also presented for completeness. For the measurements made with the six distortion screens, the data presented in this report consist of the dimensionless total pressure, static pressure, the axial, circumferential, and radial components of velocity, and the local flow incidence on the blades plotted as a function of the circumferential location for the upstream and downstream measuring locations.

Experimental Facility

The entire experimental program was conducted in a facility referred to as the Axial Flow Research Fan (AFRF), which is located in the Garfield Thomas Water Tunnel Building at The Pennsylvania State University. The AFRF was designed specifically for studying unsteady flow phenomena in axial flow turbomachinery. Thus, the overall dimensions of the facility are sufficiently large to allow the blades to be instrumented and flow surveys to be conducted with few spatial limitations. Figure 1 is a sketch of the facility which shows the major components and overall dimensions.

One of the important features of the facility to be noted in Figure 1 is the distance between the distortion producing screen and the test rotor.

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The long section between the screen and the rotor allows sufficient time for small disturbances produced by the screen to decay. Therefore, a smooth velocity profile of the desired shape is attained upstream of the rotor. The long settling section also isolates the rotor from the screen, thus eliminating any interaction between the rotor and the screen. This is very important since a rotor will strongly alter the upstream flow in the immediate vicinity of the rotor.

An important feature of the AFRF with regard to this investigation is the ability of the outer casing surrounding the rotor-stator stage to be rotated freely about the centerline of the facility. This feature is provided to enable circumferential surveys of the flow to be performed by rigidly attaching instrumentation to the casing. During circumferential surveys of the flow, the rotation of the test section is automatically controlled by the data acquisition system.

The AFRF utilizes split outer casing and hub sections both upstream and downstream of the stator. By interchanging sections of different lengths, it is possible to move the stator blade row relative to the rotor blade row. Tests with rotor-stator axial spacings, rotor trailing edge to stator leading edge, of 3, 6, 9, or 12 inches (i.e., 7.62, 15.24, 22.86, or 30.48 cm) are possible. For six-inch (15.24 cm) chord blades, these dimensions correspond to nondimensional rotor-stator spacings from 0.5 to 2.0 blade chord lengths.

The flow rate through the facility is controlled either by the throttle setting or by the speed of the auxiliary fan. The locations of these two components are shown in Figure 1. Both the auxiliary fan and the test rotor speed are controlled by Borg-Warner variable frequency inverter units. It should be noted that the auxiliary fan will provide

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an axial through flow even if the test rotor is not installed. This is a feature not found in most facilities, and it enables the distortions to be measured in the absence of the rotor. The auxiliary fan also permits test rotors with zero mean blade loading to be tested. A detailed description of the AFRF is presented in Reference [3].

Two test rotors were employed in this investigation. The first rotor used was assembled with six blades and designed for zero mean loading in an ideal flow. The rotor was designed with this criterion primarily to enable accurate comparisons to be made with unsteady cascade theories which are usually restricted to zero or lightly loaded blades. The blades have no camber, a C1 profile with ten percent thickness, a 6.0 inch (15.24 cm) chord, and a 5.9 inch (14.99 cm) span. The blades are twisted such that, at the design condition, the incidence is zero at all radii and there is a stagger angle of 45 degrees at the mean radius. The blades can be rotated ten degrees in either direction so that stagger angles of 35 and 55 degrees at the mean radius can also be obtained. The second rotor used in this study was a nine-bladed rotor with cambered blades and a fixed stagger angle of 50 degrees at the mean radius. This rotor was designed to investigate unsteady pressures, forces, and moments with nonzero steady forces and moments. The rotor was designed with free-vortex loading, and the profile, chord length, and span are identical to the zero steady lift rotor.

For the studies involving distorted flow, disturbance producing screens are placed in the inlet which produce sinusoidal or square circumferential distortions with amplitudes of approximately 20 percent of the average axial velocity. These screens were constructed by fastening segments of screens with varying solidity to a heavier support

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screen with a small solidity. The screens provide a capability to carry out experiments at reduced frequencies from 0.27 to 2.46, based on a chord length of six inches, and stagger angle of 45 degrees. The design and performance evaluation of these distortion generating screens are presented in Reference [4].

Instrumentation

The general experimental apparatus for all the tests conducted in this study is shown in Figure 2. This figure includes a sketch of the test facility and a schematic of the instrumentation. The two axial locations where the majority of flow measurements were made are referred to as Location 1-D and Location 15, which are located 0.137 blade chord lengths upstream of the rotor and 0.82 chord lengths downstream of the rotor, respectively. For the series of tests conducted with the stator blades located in the forward position, 0.5 chord lengths behind the rotor, the downstream probe was moved to a position designated as Location 15-A, which is located 0.40 chord lengths downstream of the rotor.

All of the flow field measurements were made with two five-hole probes employed in the non-nulling mode. The five pressures measured from each probe are reduced using detailed calibrations of the probes, and they yield the total pressure, static pressure, and the three velocity components at each location or run condition. The schematic in Figure 2 shows the instrumentation used to measure the pressures from each probe and the automatic controls used to conduct the various tests.

All pressure measurements were made with a single differential pressure transducer through the use of a scanivalve. The atmospheric pressure served as the reference pressure for the transducer, thus a

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reading from an open channel on the scanivalve corresponded to the transducer zero. At each location or run condition, the voltages representing the ten pressures from the two probes and the transducer zero were recorded automatically on paper tape. The data recorded on paper tape was then fed into an IBM 1130 Computing System for data reduction.

In addition to the pressure measurements, it was necessary to measure the rotational speed of the rotor. A conventional system employing a slotted disc rotating with the rotor, a light source, a photocell, and an electronic counter in the data acquisition system was used for this purpose. With sixty slots in the disc and a one-second sample period, the counter reading gave the RPM of the rotor directly and displayed it on the data logger.

Before concluding the section on instrumentation, some additional information will be given on the five-hole probes since they are the key components in the experimental system. The probes used in this investigation were calibrated in a known flow field by A. M. Yocum. Detailed information concerning the calibration procedure, the characteristics of the calibration data, how the calibration data is applied, and the accuracy of the five-hole probes appears in References [2] and [5].

The probes employed in this study were commercially available United Sensor five-hole prism type probes. Five-hole probes were selected for the measurements because they enable the total pressure, static pressure, and axial, circumferential, and radial components of velocity to be determined. The geometry of the prism type probes offers easy insertion and mounting of the probe in the AFRF. An enlarged sketch of the sensing element and a sketch of the entire probe showing its dimensions is presented in Figure 3.

The five-hole probes employed in the experimental program were used in a non-nulling mode, which means that they had a fixed orientation with respect to the casing during the tests. This means that relationships must be determined between the measured pressures at the five holes and the true, local total and static pressure or velocity. These desired relationships are usually expressed as dimensionless pressure coefficients, which are functions of the flow angularity.

The two flow angles and the true total and static pressures are calculated from the five pressures measured from the probe through the use of a detailed calibration. With this information known, when the probe is placed in an unknown flow, the yaw and pitch angles of the unknown flow can be determined through the use of the calibration data. After the two angles are known, the total and static pressure coefficients are interpolated from the calibration data and the two pressures can then be calculated. The velocity is calculated with the Bernoulli equation and then resolved into its axial, circumferential, and radial components using the known flow angles.

The accuracy of the measurements made with the five-hole probes was checked by comparing the results with data obtained using other types of instrumentation in Reference [2]. In the absence of the rotor, static pressure gradients do not exist far downstream of the distortion producing screen. Circumferential surveys of the flow in the AFRF can be conducted using a Kiel probe to measure total pressure and a wall tap in the casing to measure static pressure. The velocity measured in this manner was compared with data obtained with the five-hole probes. The agreement was found to be very good, which demonstrated the validity of the five-hole probe measurements and data reduction (Reference [2]).

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Experimental Procedures

The experimental procedures for the various tests conducted with the two test rotors were very similar. At the beginning of each test, the ambient temperature and pressure were recorded, the initial running condition was set, and for each location or run condition the eleven voltages were recorded. For all the tests except those which specifically investigated the effect of flow rate, the average axial velocity was approximately 67 ft/sec (20.4 m/sec). This velocity corresponds to the uncambered rotor design condition when the rotor is rotating at 1000 RPM. To vary the mean incidence on the blades, the rotor RPM was varied instead of the flow rate; thus, the five-hole probes were always able to operate in approximately the same Reynolds number range.

The first set of tests conducted were steady performance measurements at the mean radius for the six-bladed rotor in its 35, 45, and 55 degree stagger angle configurations and for the nine-bladed rotor with its fixed stagger angle of 50 degrees. For these tests, the rotor RPM was varied in steps to provide two degree increments in incidence angle over a range of incidence from - 10 degrees up to the point where the rotor stalled or where the exit flow angle was out of the probe calibration range.

To set the velocity for the rotor performance measurements, the upstream five-hole probe was located at the mean radius and the center hole of the probe was used to sense the total pressure of the flow. A static pressure wall tap located at the same axial location as the five-hole probe was used to sense the static pressure. These two pressures were applied to opposite sides of a differential pressure transducer and the resulting voltage output was proportional to the dynamic pressure of the flow. The dynamic pressure was then used to obtain the desired flow velocity. After

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the running condition was set, the pressure sensed by the wall tap located near the entrance of the AFRF was recorded. This pressure was later correlated with the velocity at the mean radius as measured by the upstream five-hole probe and could be used in subsequent tests for setting the velocity.

The next and most important series of tests measured the distorted flow fields upstream and downstream of the operating rotor. In order to describe the method used for setting the velocity for this series of tests, it is necessary to describe the method used by Yocum for making measurements of the distortion produced by the screens in the absence of the rotor (Reference [2]). For the tests conducted without the rotor installed, the velocity was set by using the probe and the wall tap at location 1-D to indicate the dynamic pressure of the flow. This method of setting the velocity is valid since the flow will be approximately axial and no radial static pressure gradient will exist without the rotor installed. To set the mean velocity in the circumferentially varying flow, a maximum or minimum velocity point was first located. The velocity was then adjusted to the desired mean velocity assuming there was a 20 percent variation. After the velocity was set, the pressure sensed by the inlet wall tap was recorded so it could be used to set the velocity in the tests when the rotor was installed. For the distortion measurements made with the rotor operating, circumferential surveys of the flow field were made with the outer casing surrounding the test section rotated at two degree increments. The velocity was set by using the inlet static pressure wall tap. By duplicating the previously measured pressure for a particular screen, the mean velocity calculated in the data reduction program was assumed to exist. The desired value of mean incidence or blade loading could then be obtained by adjusting the RPM of the test rotor.

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Results

The results from all the tests are presented in Appendices A through G. Appendix A contains the steady performance data of the six-bladed uncambered rotor and the nine-bladed cambered rotor. Also contained in Appendix A is a brief description of the performance parameters used.

The remaining appendices, Appendices B through G, document all of the distortion measurements which were made using the two test rotor. Each appendix contains the results for one type of distortion. Included at the beginning of each appendix is a table which lists the run conditions for each test and the numbers of the figures containing the data for a particular test. There are six figures for each set of data; these figures show the dimensionless axial, circumferential, and radial velocity components, the dimensionless total and static pressures, and the local flow incidence plotted versus circumferential location both upstream and downstream of the rotor. The same order of presentation of the data is followed in each Appendix. First, the six-bladed rotor data is presented. This is followed by the nine-bladed rotor data taken at the mean radius for a rotor-stator spacing of 2.0 chord lengths. Next, the nine-bladed data at the mean radius for a rotor-stator spacing of 0.5 chord lengths is presented. Finally, the nine-bladed rotor data measured at the four radii other than the mean radius is shown in the following order: radius=4.58 inches (11.64 cm), radius=3.67 inches (9.31 cm), radius=1.83 inches (4.66 cm), and radius=0.92 inches (2.33 cm) from the surface of the inner hub. It should be noted that the six-bladed rotor was only tested in the four- and six-cycle sinusoidal distortions, and the radial or spanwise variations of the flow field using the nine-bladed rotor were only tested in the two- and four-cycle sinusoidal distortions. The square distortions were used for all the tests.

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The velocity for normalizing the data was chosen to be the average axial velocity at location 1-D. This velocity was found to be more convenient than the rotor speed because it enabled the same scales to be used for presenting the data for all the rotor configurations. The average operating parameters are shown at the top of each figure, and the average axial velocity used for normalizing the data was calculated as the arithmetic average of the data from the 180 circumferential measurement locations. The pressure rise coefficients printed at the top of the distortion figures are normalized by $\frac{1}{2}\rho V_{avg}^2$ in order to be consistent with the manner in which the distortion data are normalized. This differs from the steady performance pressure rise coefficient which is normalized by $\frac{1}{2}\rho U^2$.

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- [1] Barr, L. C., "The Unsteady Response of an Axial Flow Turbomachinery Rotor to Inlet Flow Distortions," Master of Science Thesis, Department of Aerospace Engineering, The Pennsylvania State University, 1978.
- [2] Yocum, A. M., "The Effects of Design and Operating Variables on the Response of an Axial Flow Fan to Inlet Flow Distortions," Master of Science Thesis, Department of Mechanical Engineering, The Pennsylvania State University, 1978 (ARL Technical Memorandum 78-178).
- [3] Bruce, E. P., "The Axial Flow Research Fan - A New Facility for Investigation of Time-Dependent Turbomachinery Flows," ASME Paper 74-FE-27, May 1974.
- [4] Bruce, E. P., "Design and Evaluation of Screens to Produce Multi-Cycle $\pm 20\%$ Amplitude Sinusoidal Velocity Profiles," AIAA Paper No. 74-623, July 1974.
- [5] Treaster, A. L. and Yocum, A. M., "The Calibration and Application of Five-Hole Probes," Proceedings of the 24th International Instrumentation Symposium, Instrument Society of America, Albuquerque, New Mexico, May 1978.

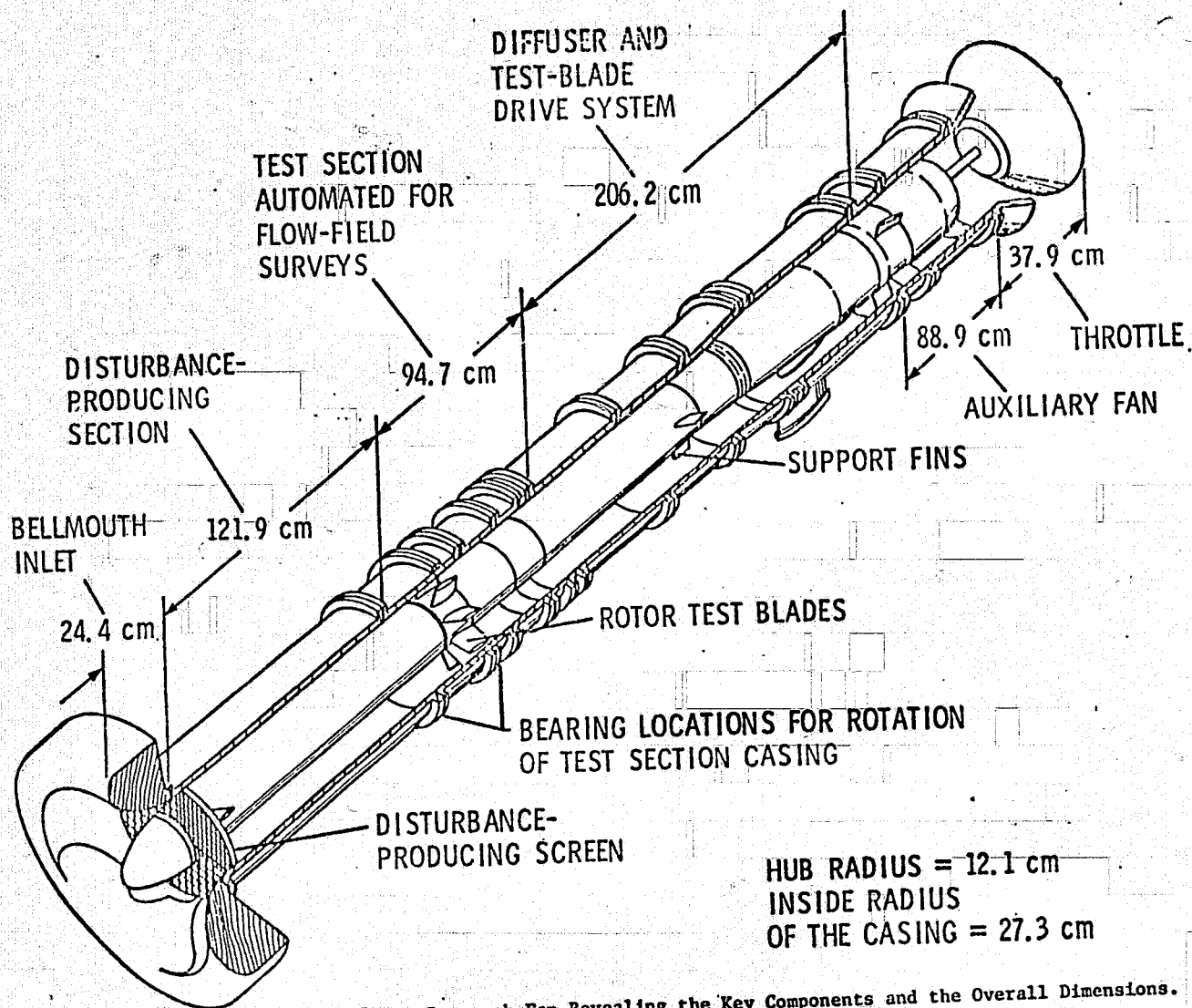


Figure 1. Sketch of the Axial Flow Research Fan Revealing the Key Components and the Overall Dimensions.

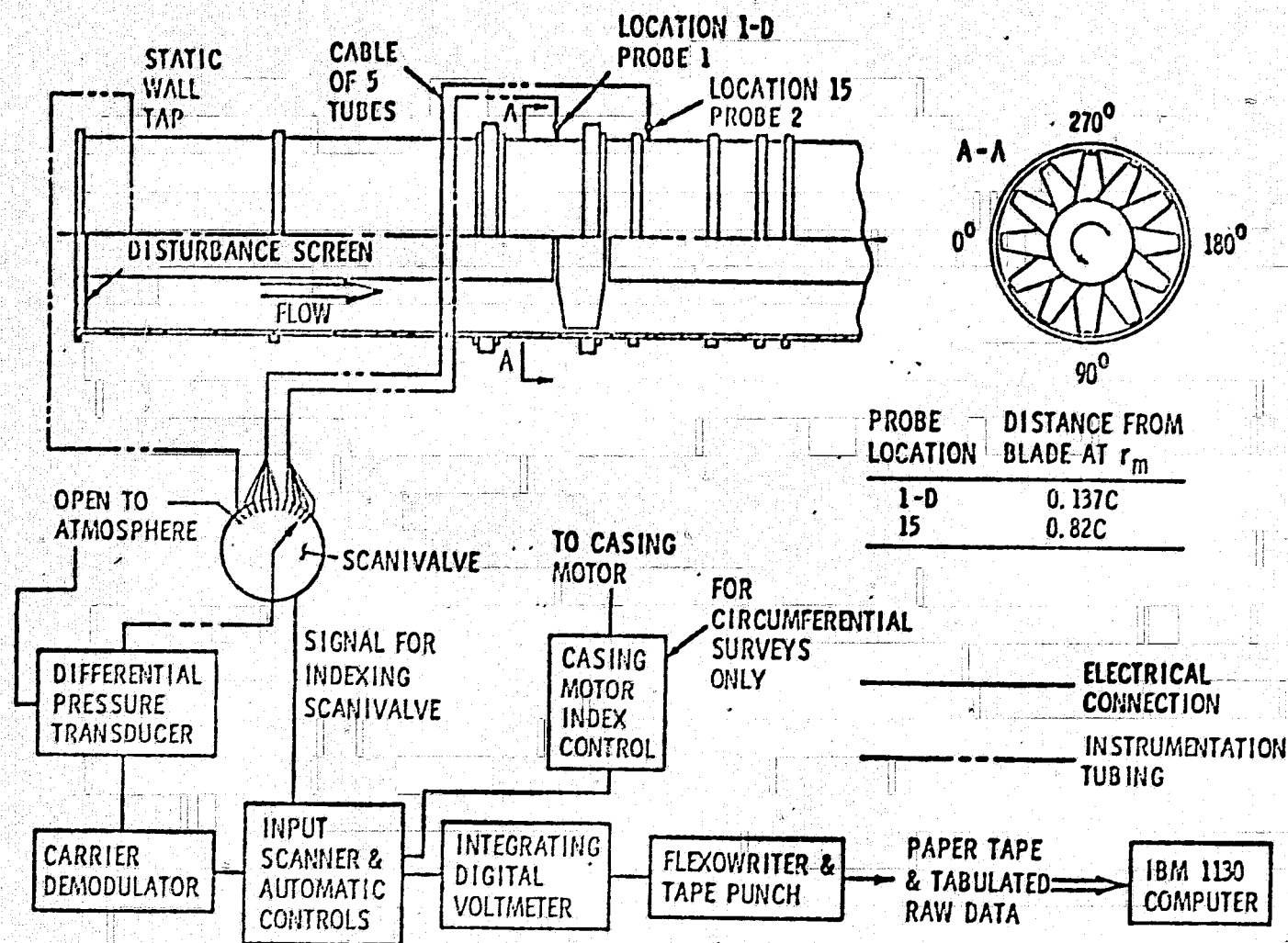


Figure 2. Schematic of probe positions and instrumentation.

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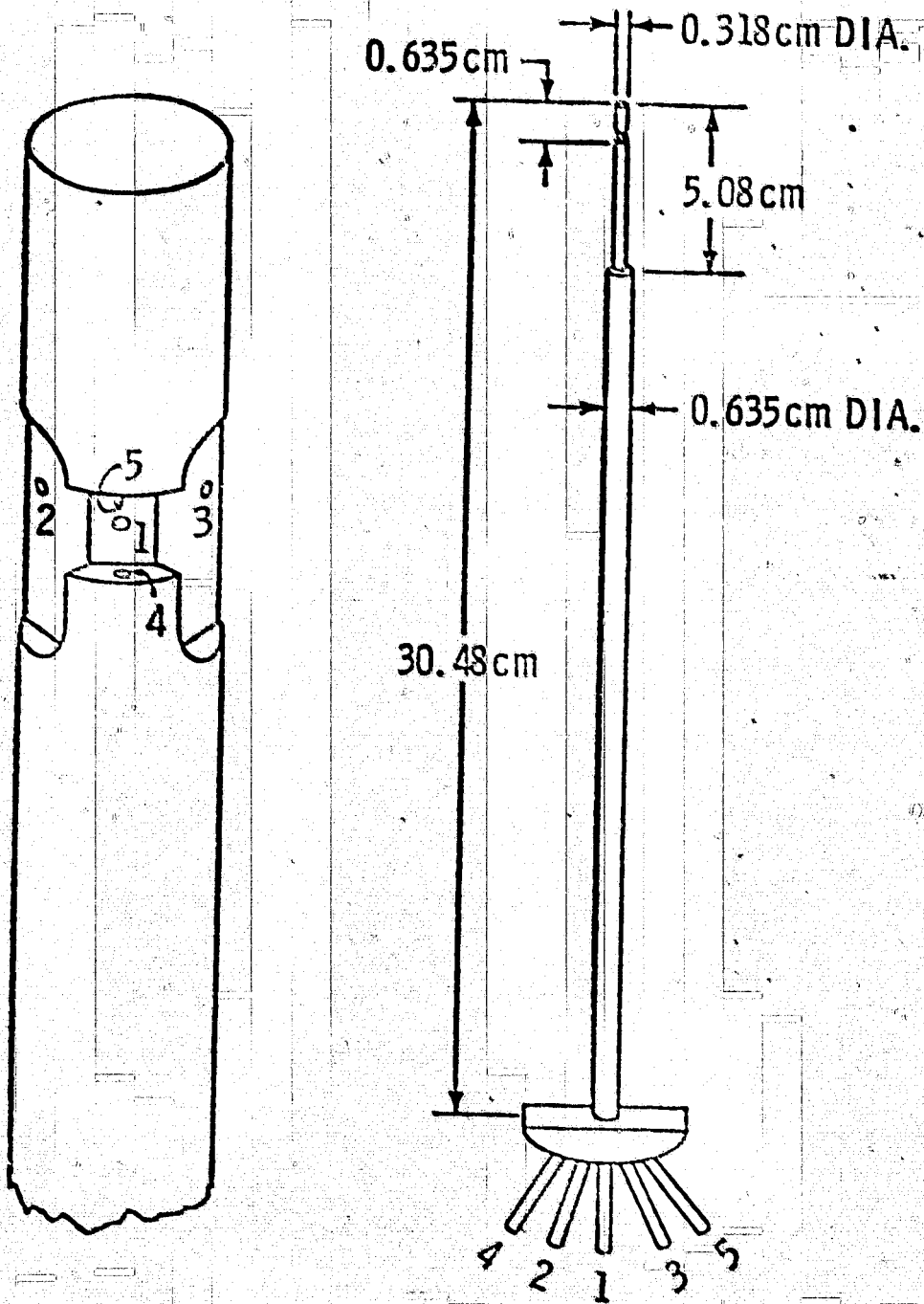


Figure 3. An enlarged sketch of the sensing element and an overall view of a United Sensor five-hole probe, Type DA-125-12-F-10-CD.

Appendix A

Steady Performance of the Six-Bladed and Nine-Bladed Rotors

Presented in this appendix are the data describing the performance of the six-bladed uncambered rotor and the nine-bladed cambered rotor operating with uniform inlet flow. All of the data are from measurements taken at the mean radius only since this is where all the distortion measurements were made. For convenience in applying the data to various methods of analysis, the data are presented in three different forms. The performance characteristics are presented for the six-bladed rotor configurations with the three different stagger angles and for the nine-bladed rotor with a fixed stagger angle.

Figures A.1 and A.2 are typical plots of loading coefficient or pressure rise coefficient versus flow coefficient for the six-bladed and nine-bladed rotors, respectively. The pressure rise coefficient is defined in the figure as the rise in total pressure normalized by $\frac{1}{2}\rho U^2$.

The amount of swirl put into the flow by the rotor is another useful performance parameter which is often required in an analysis. The dimensionless circumferential component of velocity downstream of the rotor is plotted as a function of flow coefficient in Figures A.3 and A.4 for the six-bladed and nine-bladed rotors, respectively.

The next three figures present the ideal and actual total pressure rise coefficients and the loss coefficient as a function of incidence angle for the six-bladed rotor. Figures A.5, A.6, and A.7 are the data for the 35°, 45°, and 55° stagger angles, respectively. Finally, Figure A.8 presents the ideal and actual total pressure rise coefficients and the loss coefficient versus incidence angle for the nine-bladed cambered rotor. These figures are provided primarily to supply information

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about the losses through the rotor. The ideal total pressure rise is determined from the swirl in the flow by using Euler's pump equation:

$$\psi_{\text{ideal}} = \frac{\Delta P_{T\text{ideal}}}{\frac{1}{2}\rho U^2} = \frac{2(V_{\theta\text{exit}} - V_{\theta\text{inlet}})}{U} \quad (\text{A.1})$$

The actual pressure rise coefficient, ψ , which was previously presented, is determined from the measured total pressure. The total pressure losses can then be determined by calculating the difference between the ideal and actual coefficients:

$$C_{PT\text{loss}} = \frac{\Delta P_{T\text{ideal}} - \Delta P_{T\text{actual}}}{\frac{1}{2}\rho U^2} = \psi_{\text{ideal}} - \psi \quad (\text{A.2})$$

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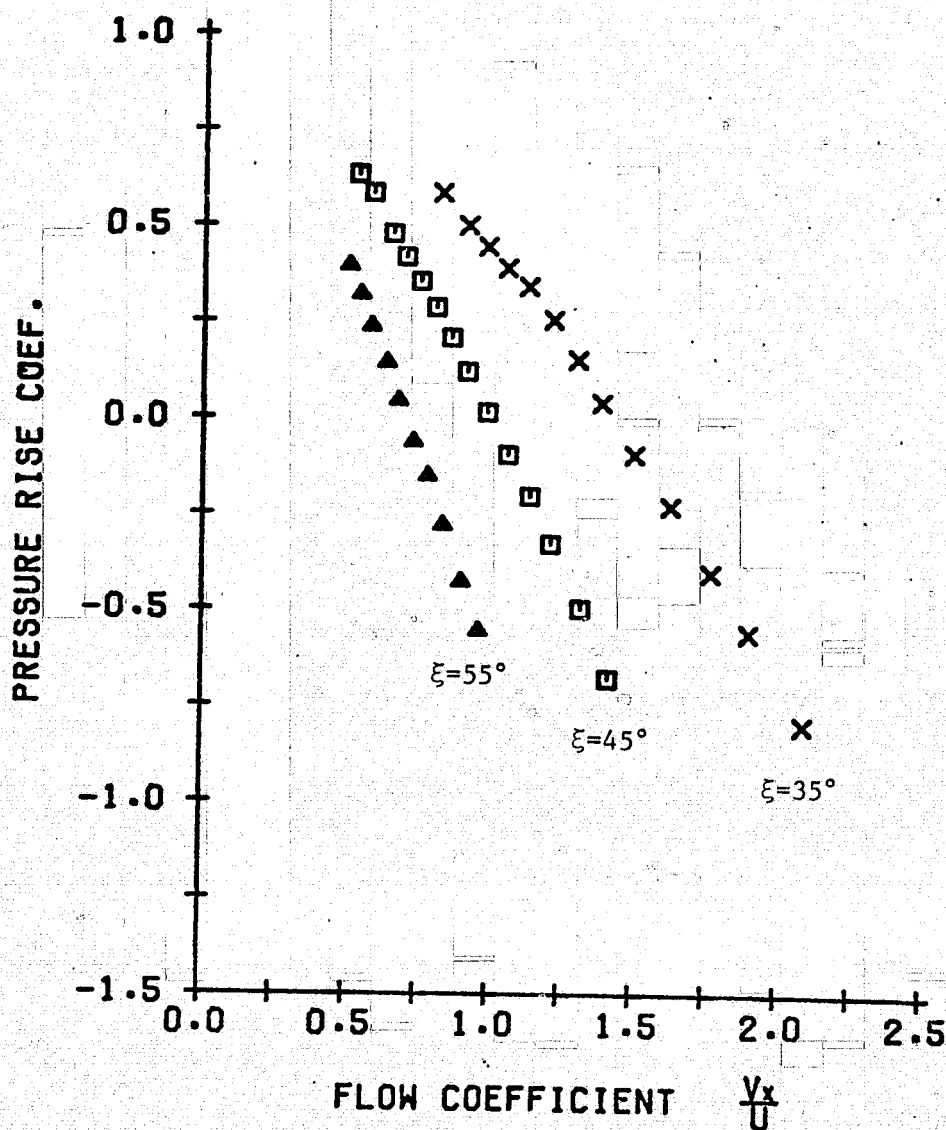


Figure A.1. Steady Performance Data Measured at the Mean Radius for the Six-Bladed Uncambered Rotor

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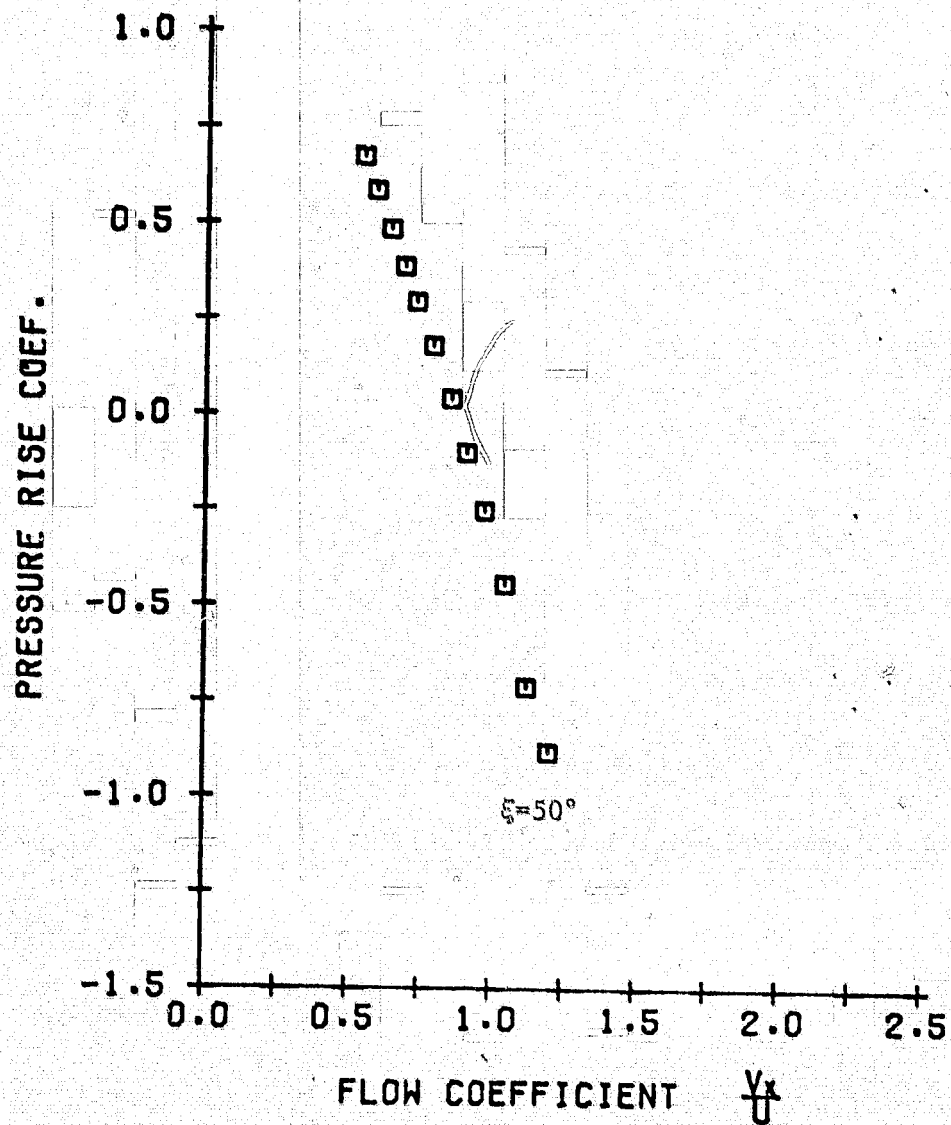


Figure A.2. Steady Performance Data Measured at the Mean Radius
For the Nine-Bladed Cambered Rotor

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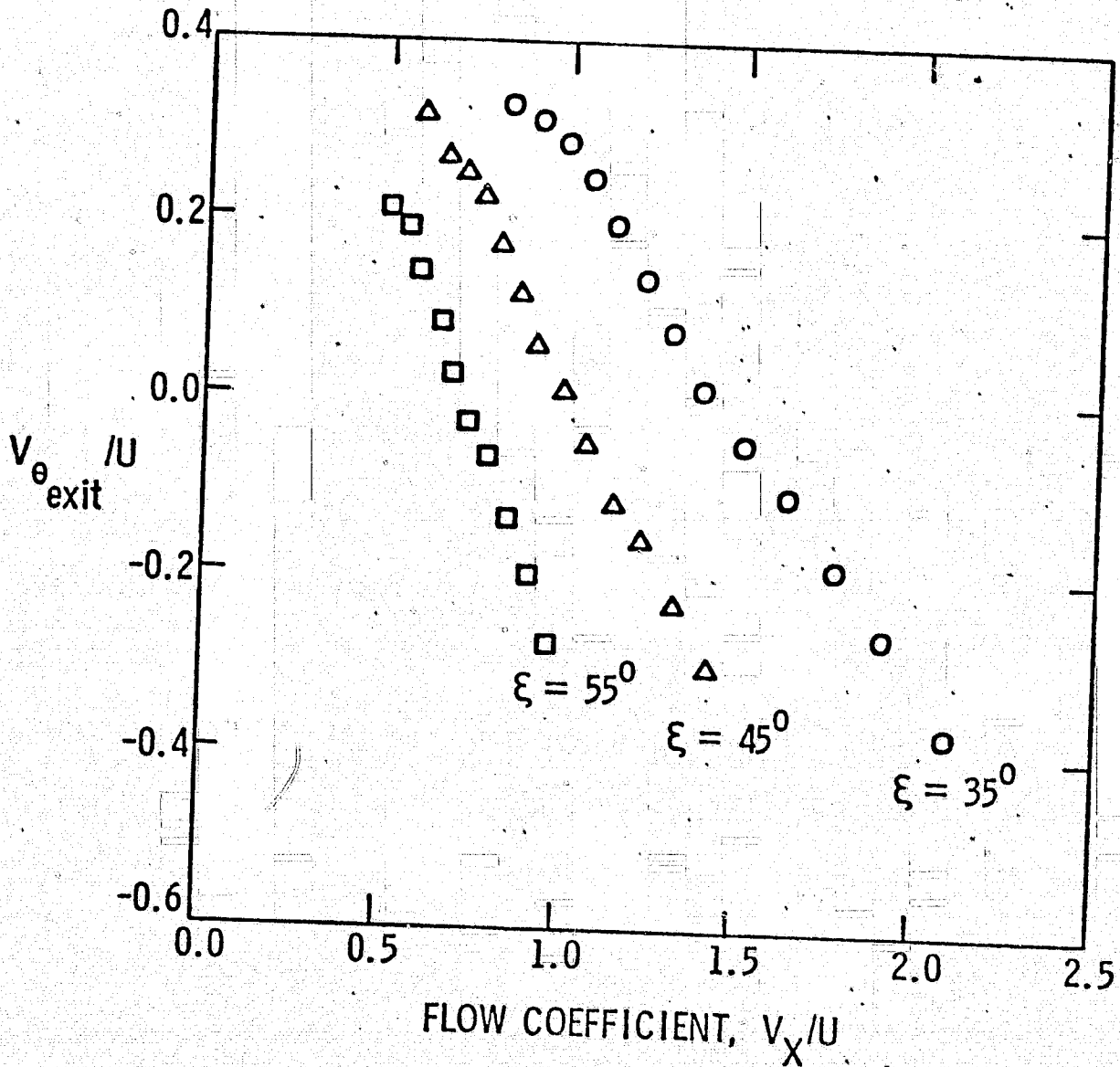


Figure A.3. A Comparison of $V_{\theta_{exit}}/U$ versus V_x/U Obtained Experimentally in Uniform Flow at the Mean Radius for the Six-Bladed Rotor

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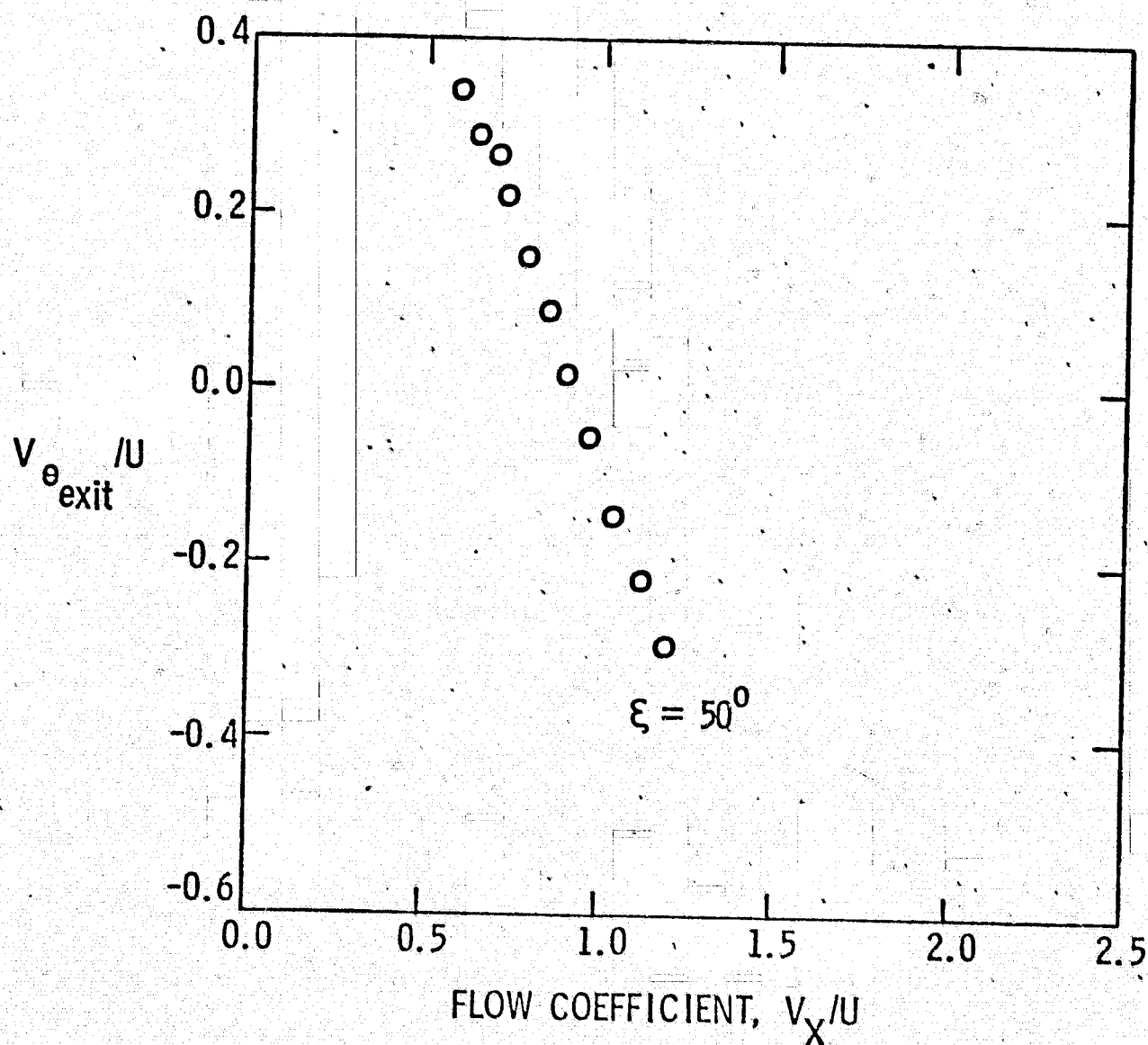


Figure A.4. A Comparison of $V_{\theta_{exit}}/U$ versus V_x/U Obtained Experimentally in Uniform Flow at the Mean Radius for the Nine-Bladed Rotor

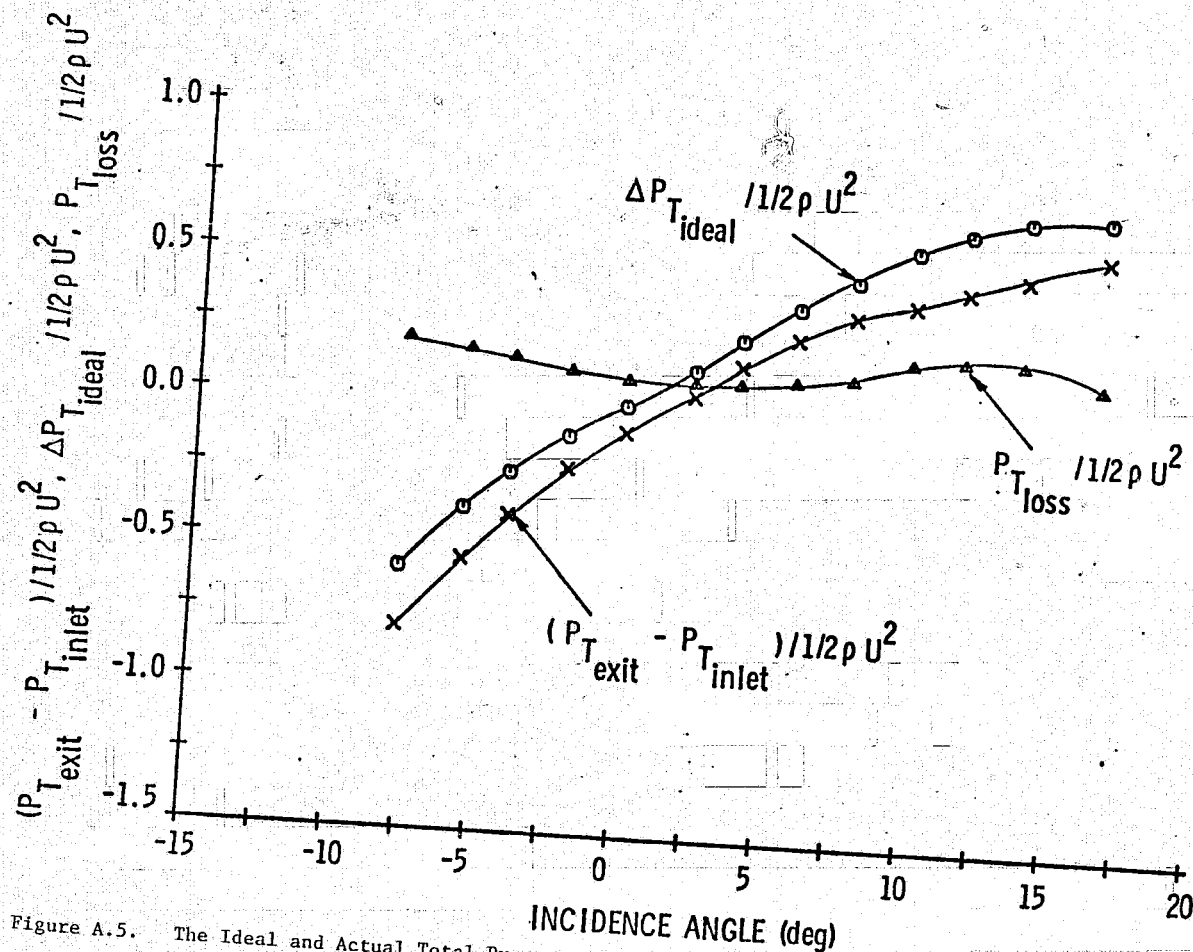


Figure A.5. The Ideal and Actual Total Pressure Rise Coefficient and the Loss Coefficient as a Function of Incidence Angle for the Six-Bladed Rotor with a Stagger Angle of 35 Degrees

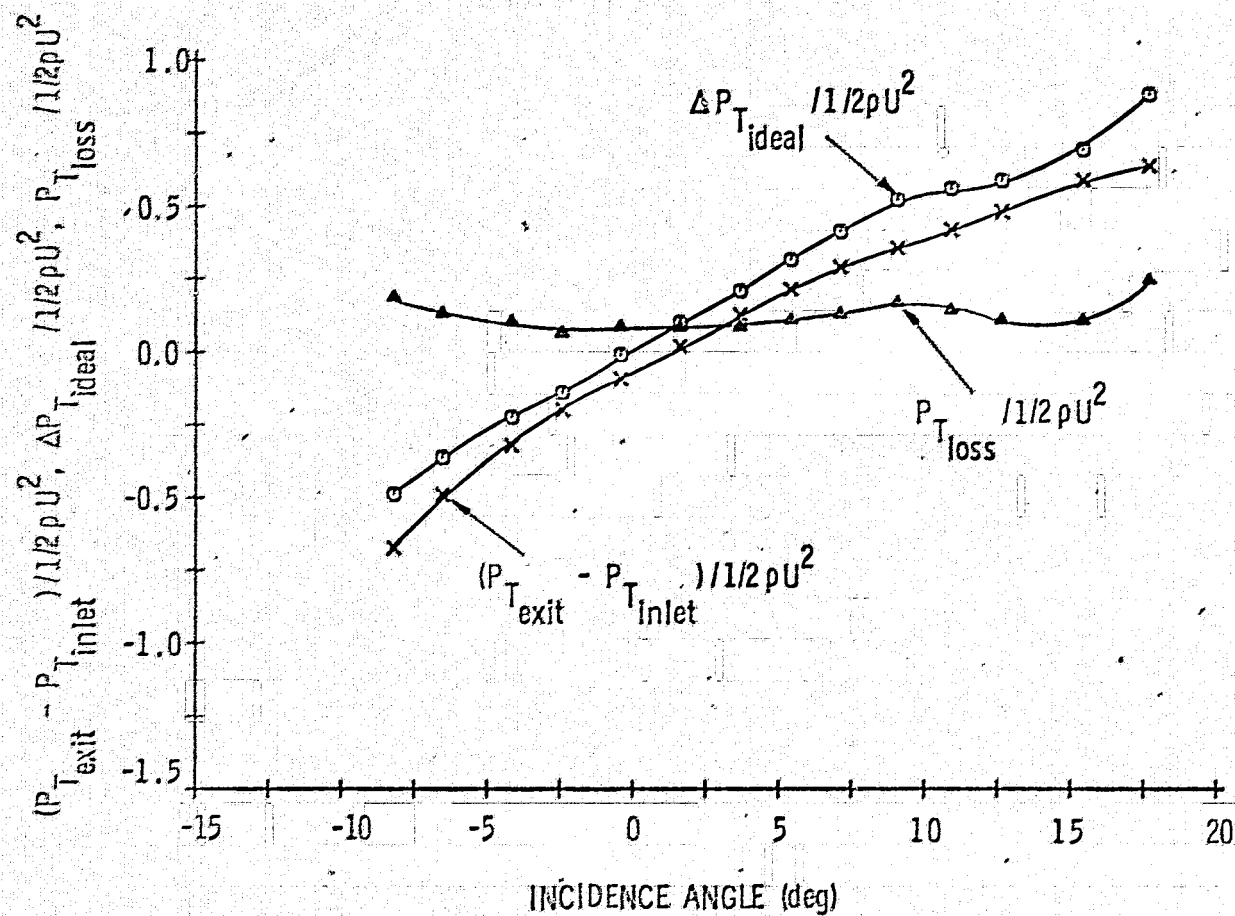


Figure A-6. The Ideal and Actual Total Pressure Rise Coefficient and the Loss Coefficient as a Function of Incidence Angle for the Six-Bladed Rotor with a Stagger Angle of 45 Degrees

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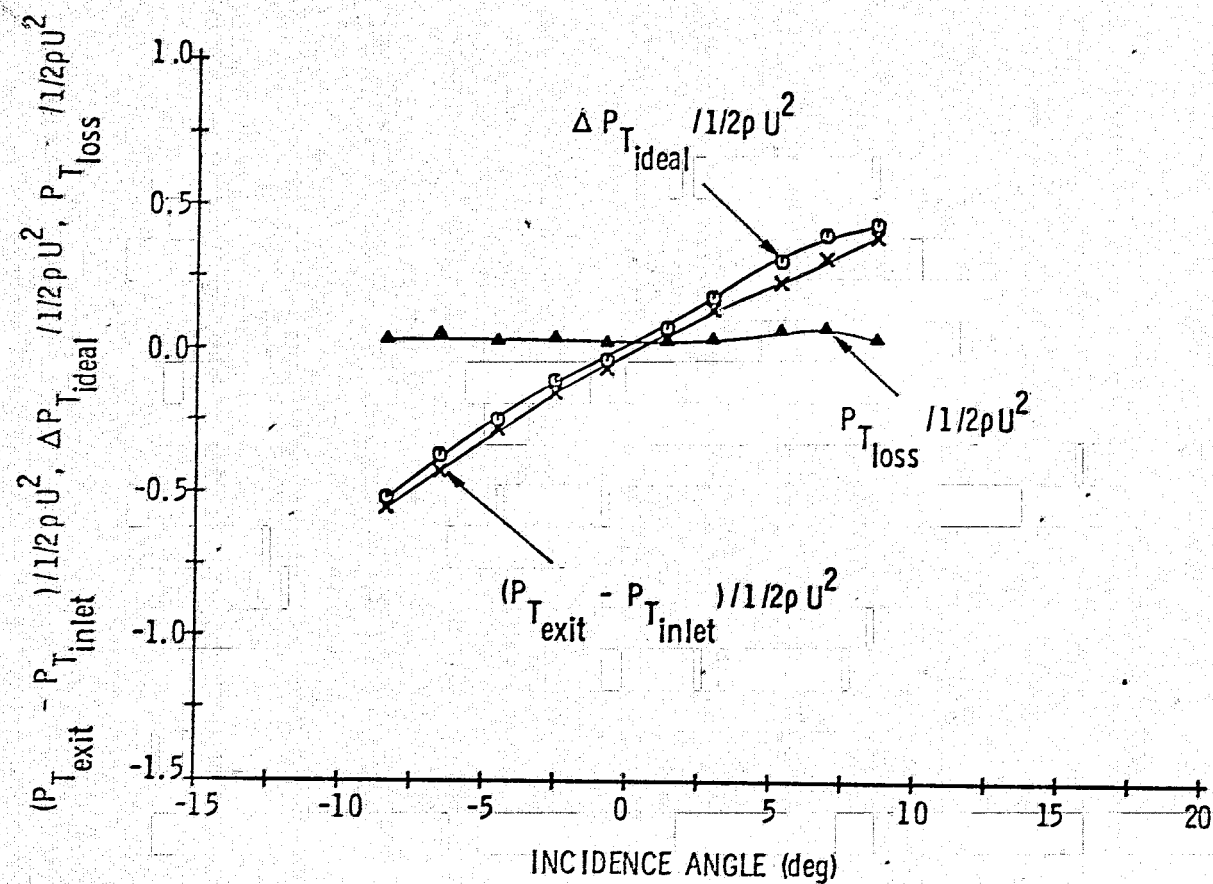


Figure A.7. The Ideal and Actual Total Pressure Rise Coefficient and the loss Coefficient as a Function of Incidence Angle for the Six-Bladed Rotor with a Stagger Angle of 55 Degrees

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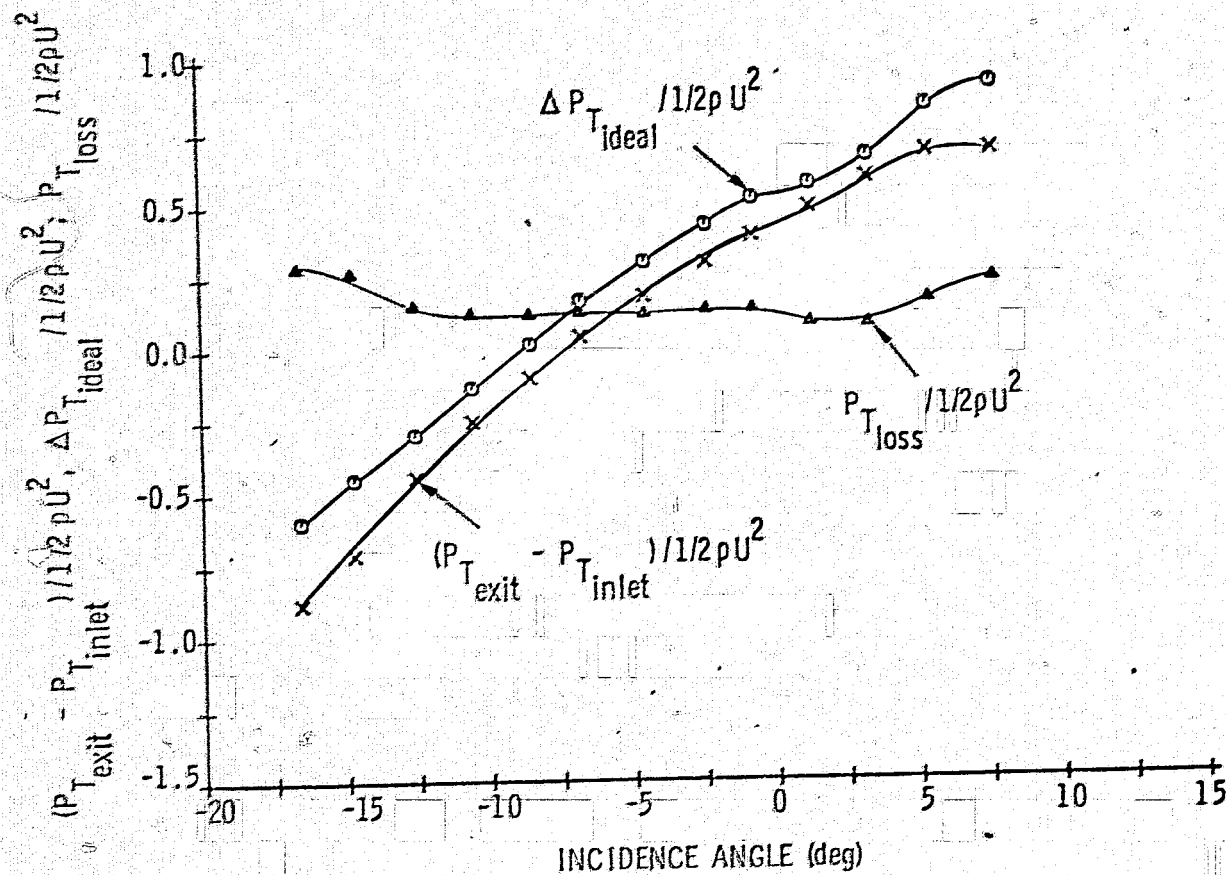


Figure A.8. The Ideal and Actual Total Pressure Rise Coefficient and the Loss Coefficient as a Function of Incidence Angle for the Nine-Bladed Rotor with a Stagger Angle of 50 Degrees

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Appendix B

Data for the One-Cycle Sinusoidal Distortion

Table B.1

Test Conditions for the One-Cycle Sinusoidal Distortion

Figure Numbers	Solidity	Rotor/Stator Spacing	Distance from Hub Surface
B.1-B.6	1.11	12 in. (30.48cm)	2.75 in. (6.985cm)
B.7-B.12	1.11	12 in.	2.75 in.
B.13-B.18	1.11	12 in.	2.75 in.
B.19-B.24	1.11	3 in. (7.62cm)	2.75 in.
B.25-B.30	1.11	3 in.	2.75 in.
B.31-B.36	1.11	3 in.	2.75 in.

Table B.1 (con't)

Test Conditions for the One-Cycle Sinusoidal Distortion

Figure Numbers	No. of Blades	Stagger Angle (degrees)	$V_{xavginlet}$ (ft/sec)	$V_{xavgexit}$ (ft/sec)	RPM	Average ϕ	Average $\Delta P_T / \frac{1}{2} \rho V_{xavg}^2$	Average Incidence (degrees)
B.1-B.6	9	50	66.77	64.23	1525	0.647	1.104	0.65
B.7-B.12	9	50	66.98	66.60	1699	0.583	1.775	3.36
B.13-B.18	9	50	66.06	64.03	1837	0.532	2.444	5.65
B.19-B.24	9	50	66.41	66.75	1525	0.644	1.117	0.95
B.25-B.30	9	50	66.34	65.24	1699	0.577	1.825	3.73
B.31-B.36	9	50	66.15	64.45	1837	0.532	2.364	5.72

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9 BLADES
50 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM = 1525

AVG. FLOW COEF. = 0.647
AVG. P-RISE COEF. = 1.104
AVG. INCIDENCE = 0.65 DEG.

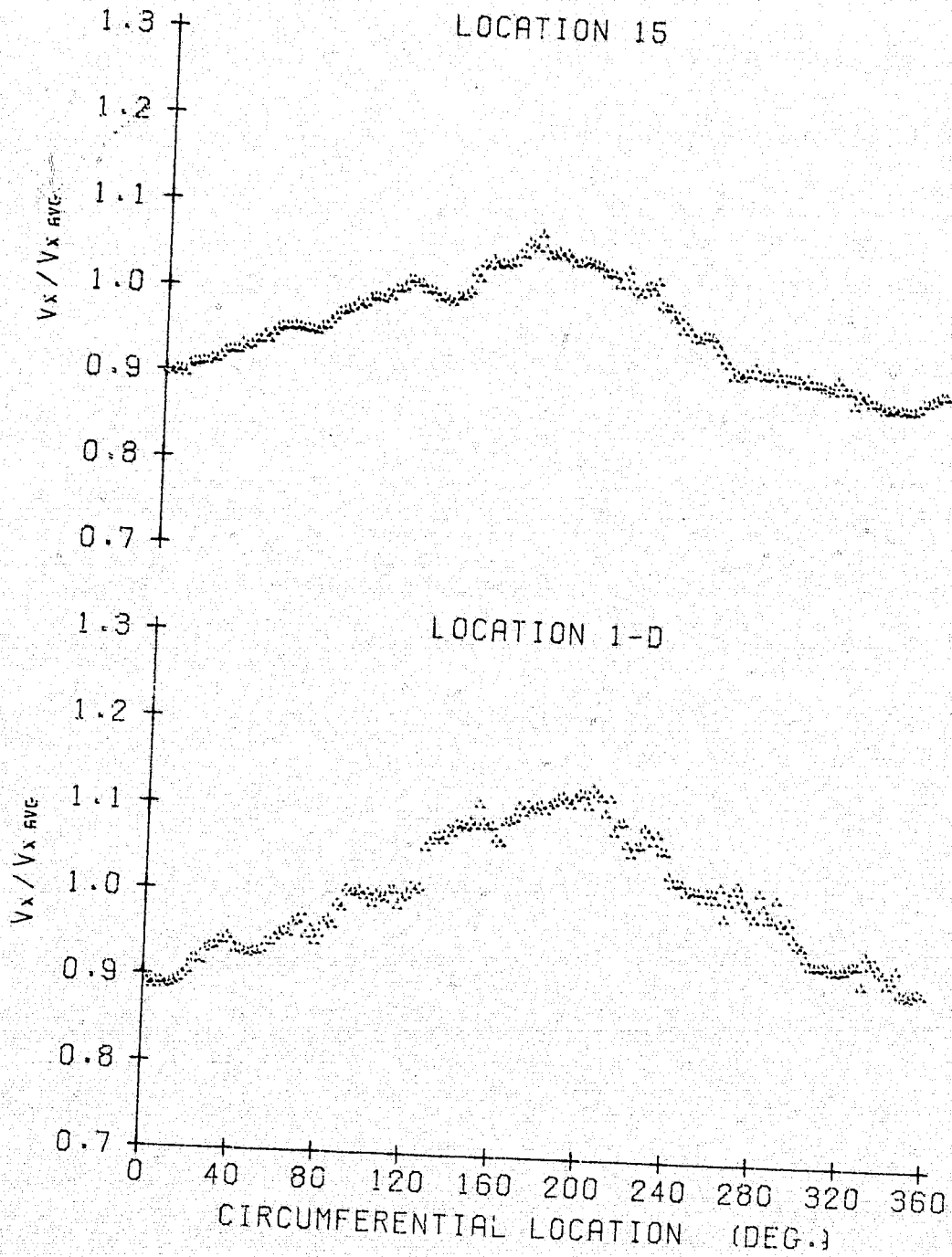


Figure B.1

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4 BLADES
50 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM = 1525

AVG. FLOW COEF. = 0.647
AVG. P-RISE COEF. = 1.104
AVG. INCIDENCE = 0.65 DEG.

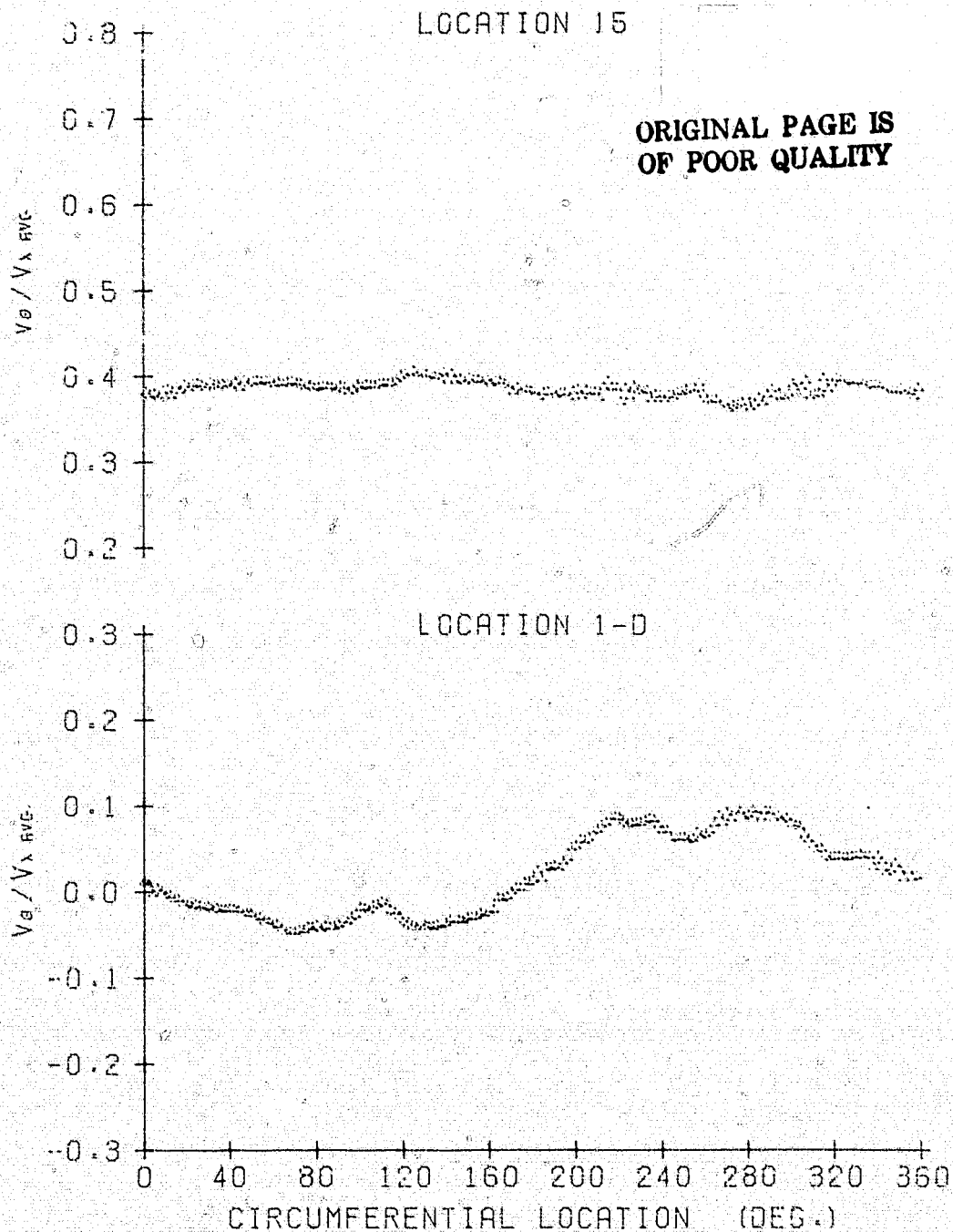


Figure B.2

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4 BLADES
50 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM : 1525

AVG. FLOW COEFF. = 0.847
AVG. P-RISE COEFF. = 1.104
AVG. INCIDENCE = 0.56 DEG.

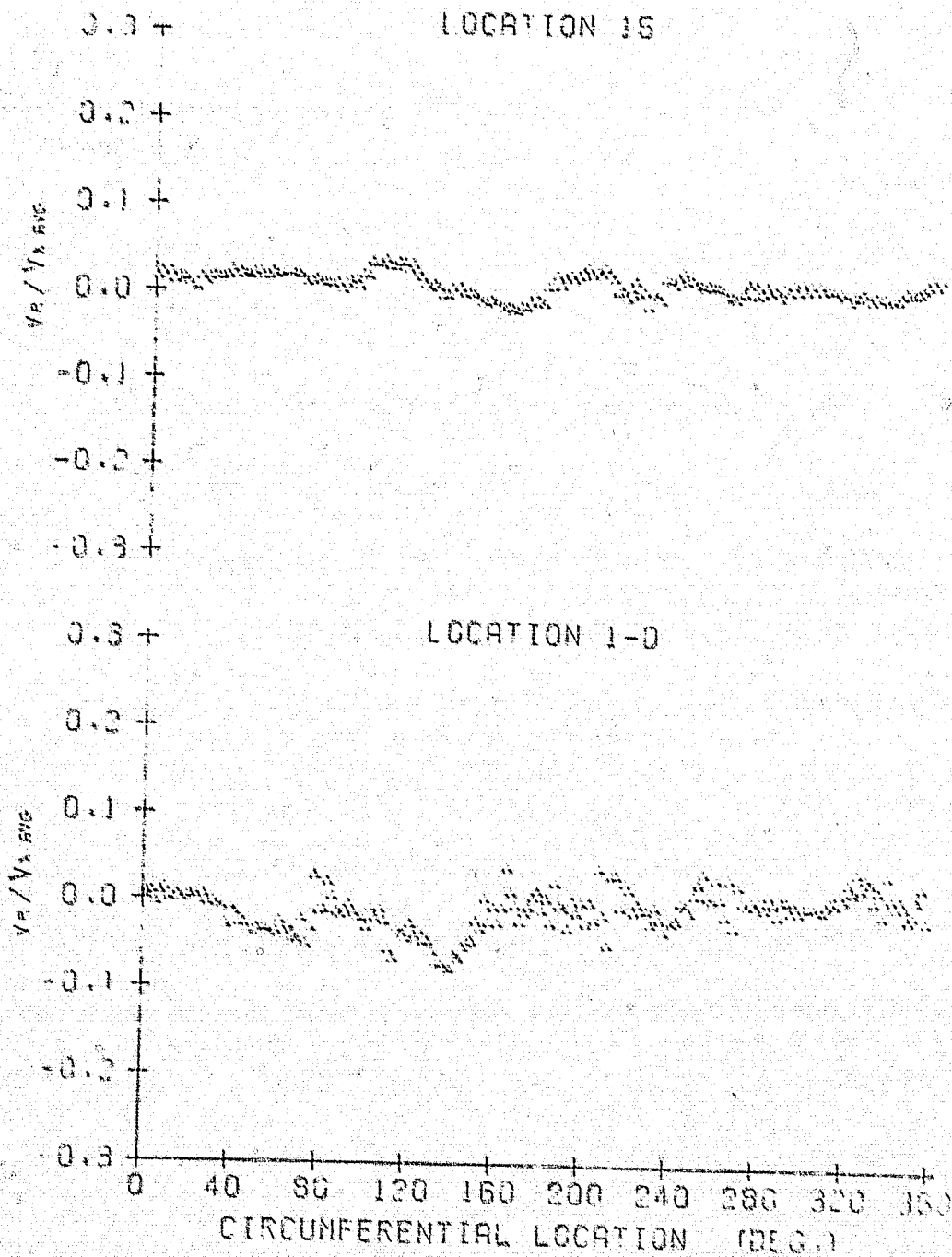


Figure B.3

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9 BLADES
50 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM = 1525

AVG. FLOW COEF. = 0.647
AVG. P-RISE COEF. = 1.104
AVG. INCIDENCE = 0.65 DEG.

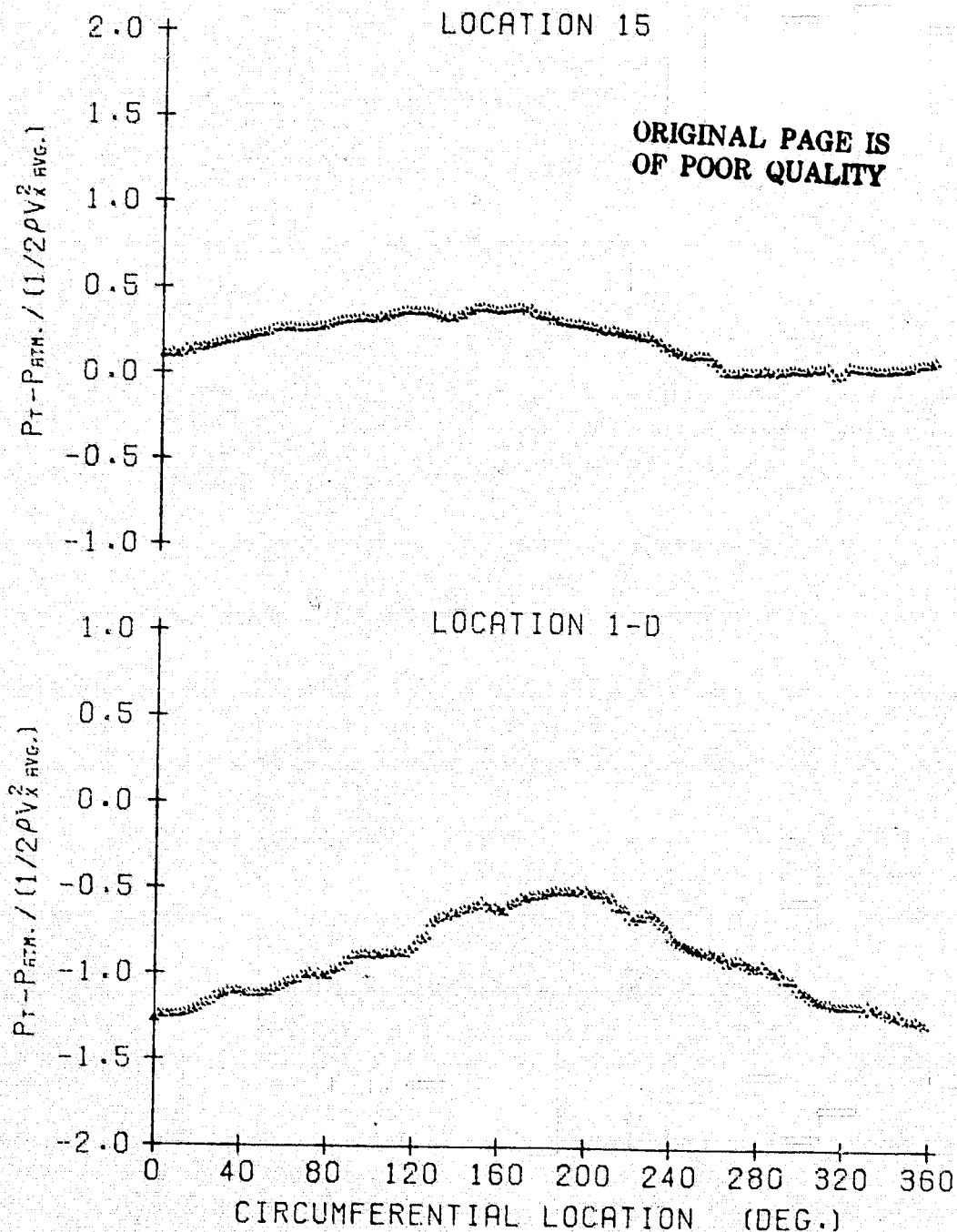


Figure B.4

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9 BLADES
50 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM = 1525

AVG. FLOW COEF. = 0.647
AVG. P-RISE COEF. = 1.104
AVG. INCIDENCE = 0.65 DEG.

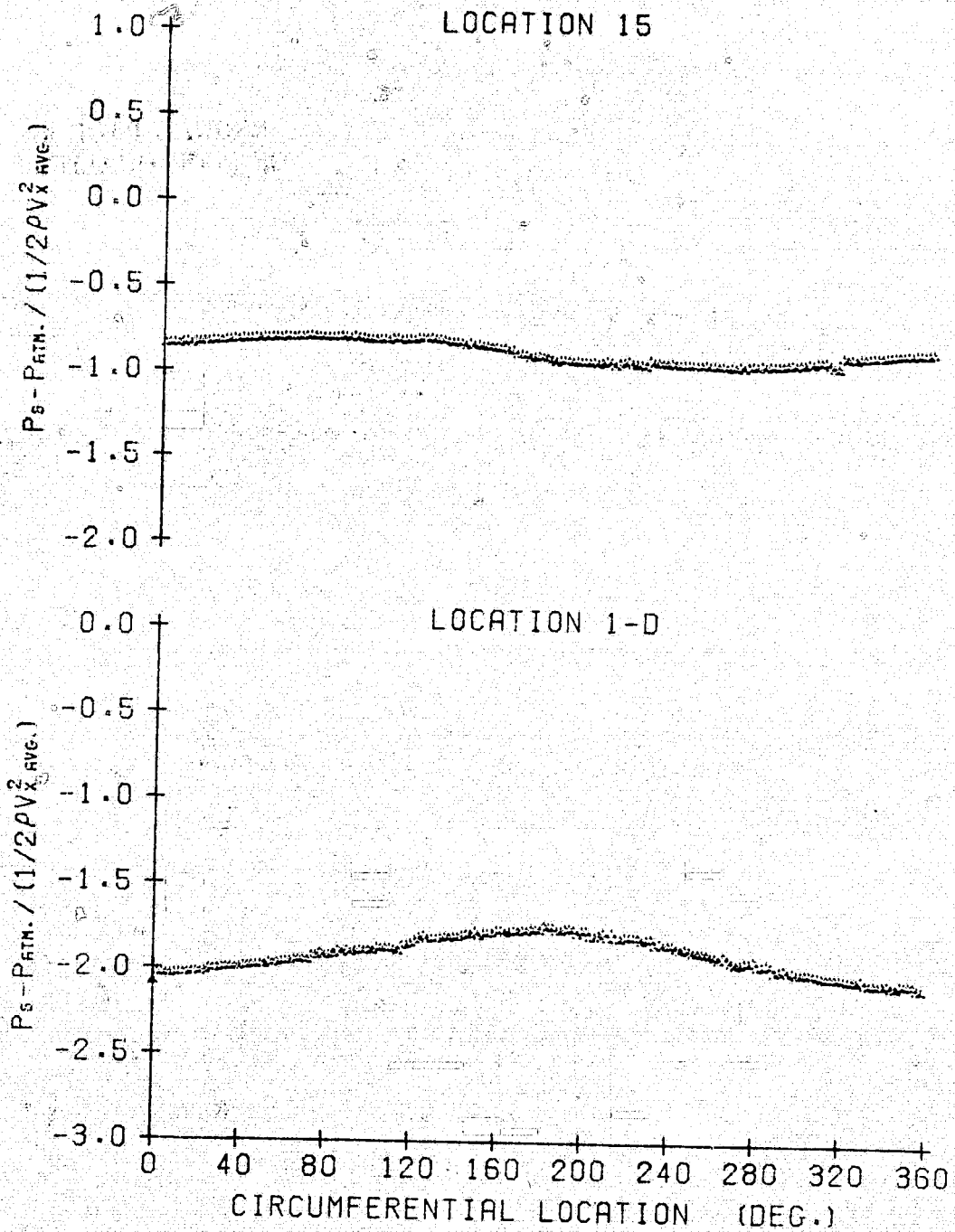


Figure B.5

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9 BLADES
50 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM = 1525

AVG. FLOW COEF. = 0.647
AVG. P-RISE COEF. = 1.104
AVG. INCIDENCE = 0.65 DEG.

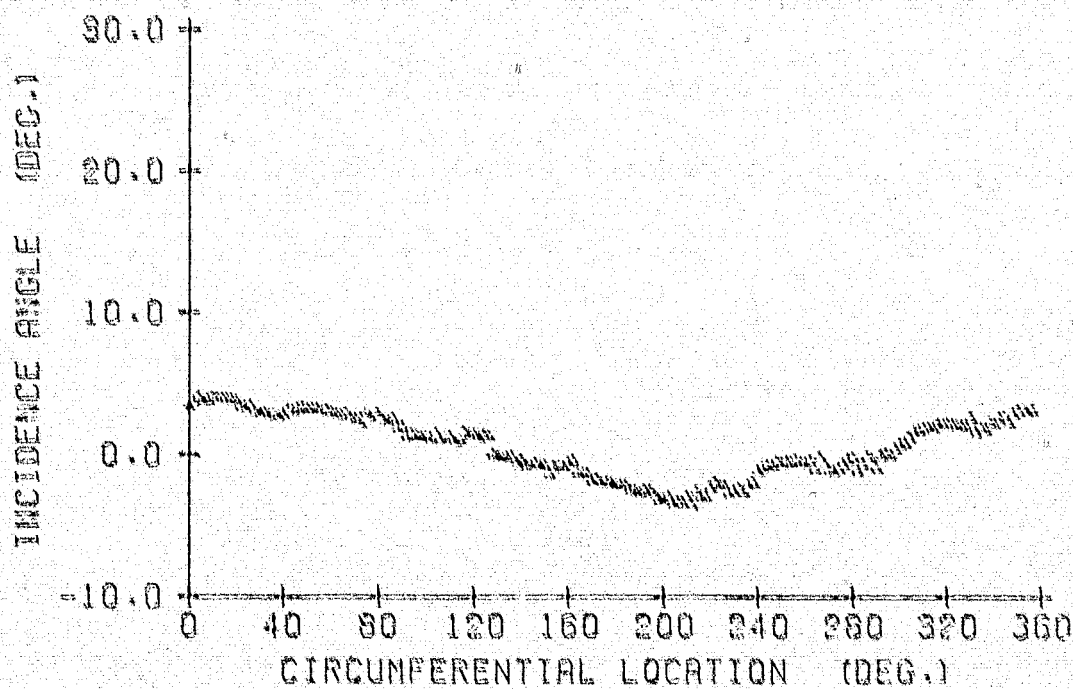


Figure B.6

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9 BLADES
50 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM = 1699

AVG. FLOW COEF. = 0.563
AVG. P-RISE COEF. = 1.775
AVG. INCIDENCE = 3.36 DEG.

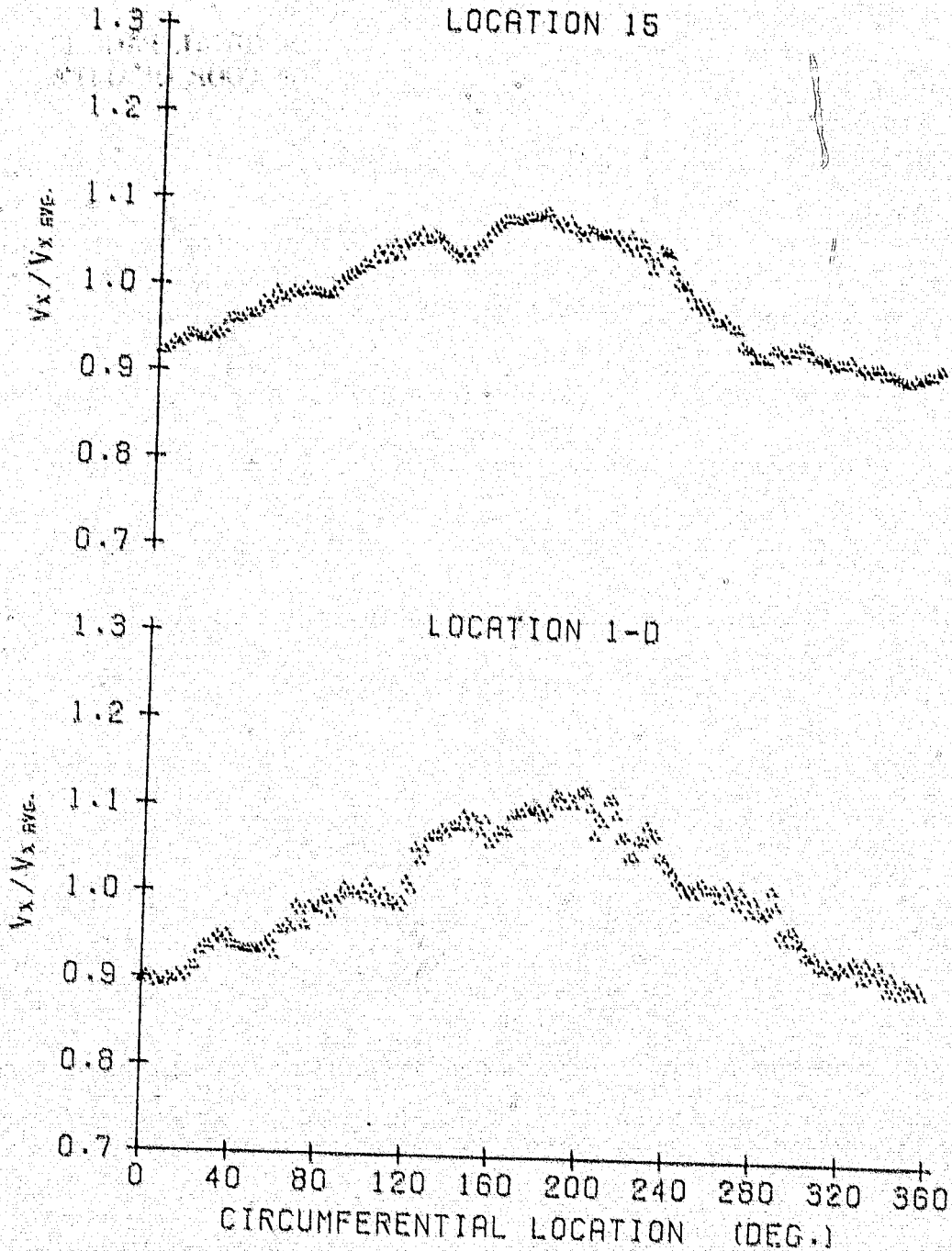


Figure B.7

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9 BLADES
50 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM = 1699

AVG. FLOW COEF. = 0.583
AVG. P-RISE COEF. = 1.775
AVG. INCIDENCE = 3.36 DEG.

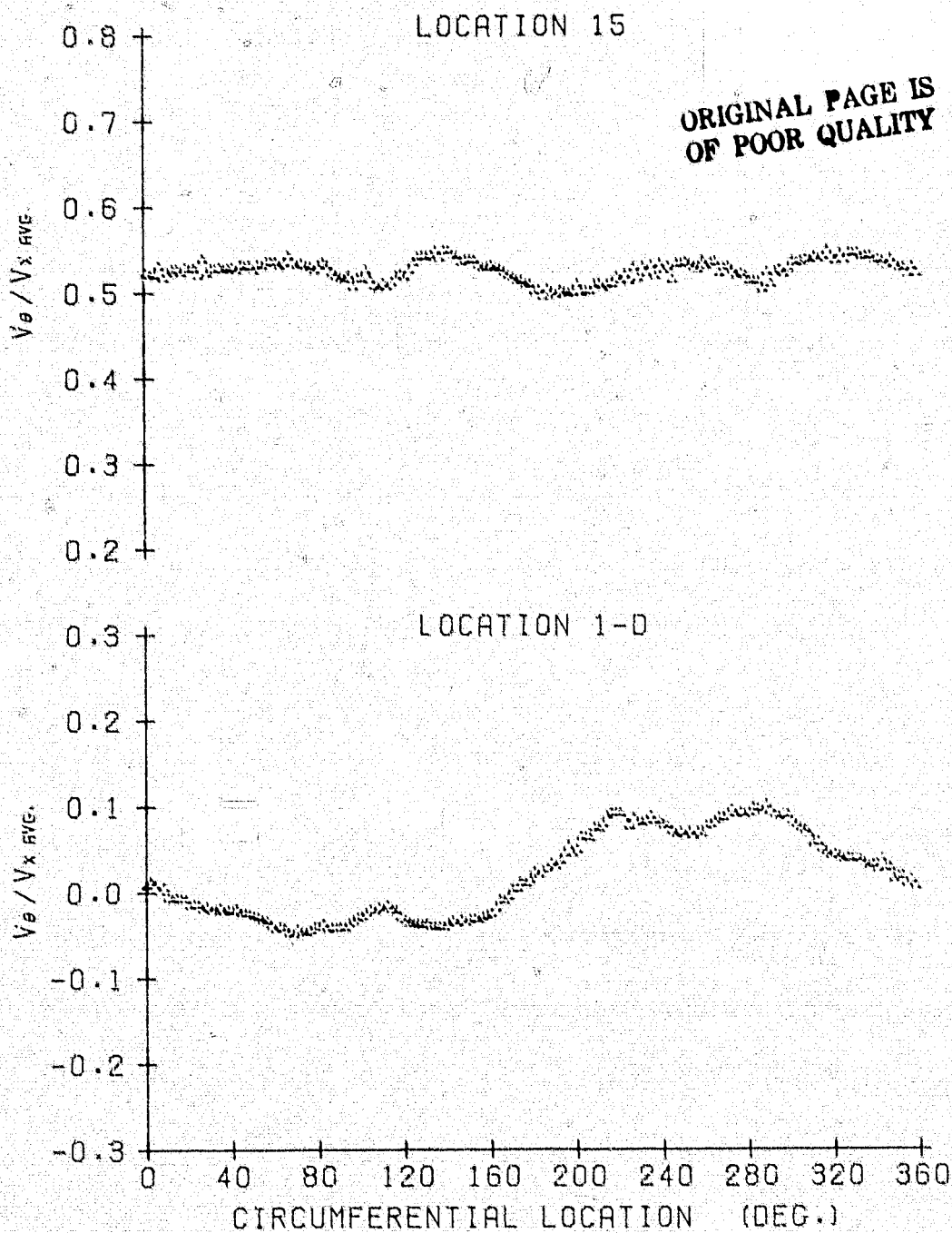


Figure B.8

10 October 1978
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9 BLADES
50 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM = 1699

AVG. FLOW COEF. = 0.583
AVG. P-RISE COEF. = 1.775
AVG. INCIDENCE = 3.36 DEG.

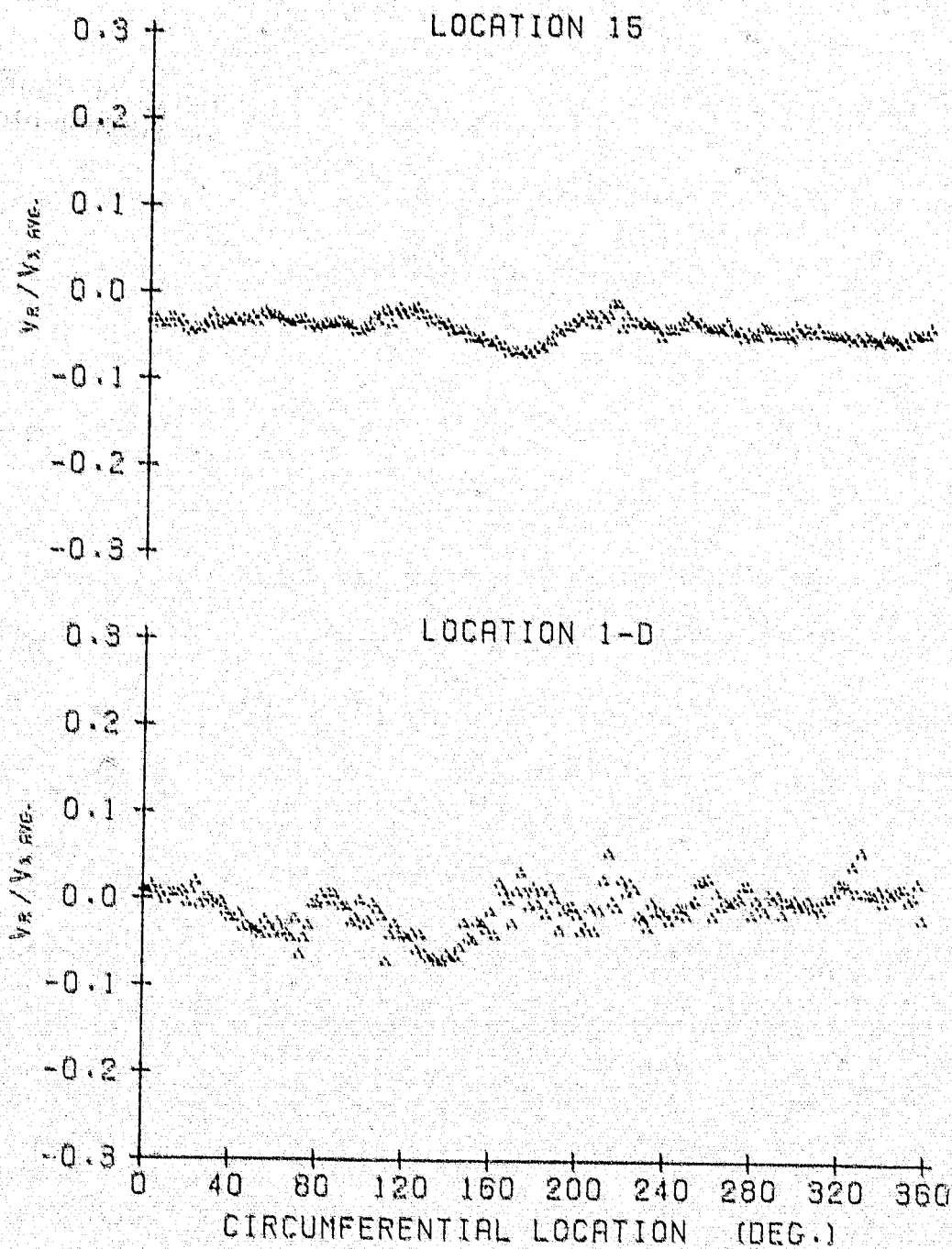


Figure B.9

10 October 1978
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9 BLADES
50 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM = 1699

AVG. FLOW COEF. = 0.583
AVG. P-RISE COEF. = 1.775
AVG. INCIDENCE = 3.36 DEG.

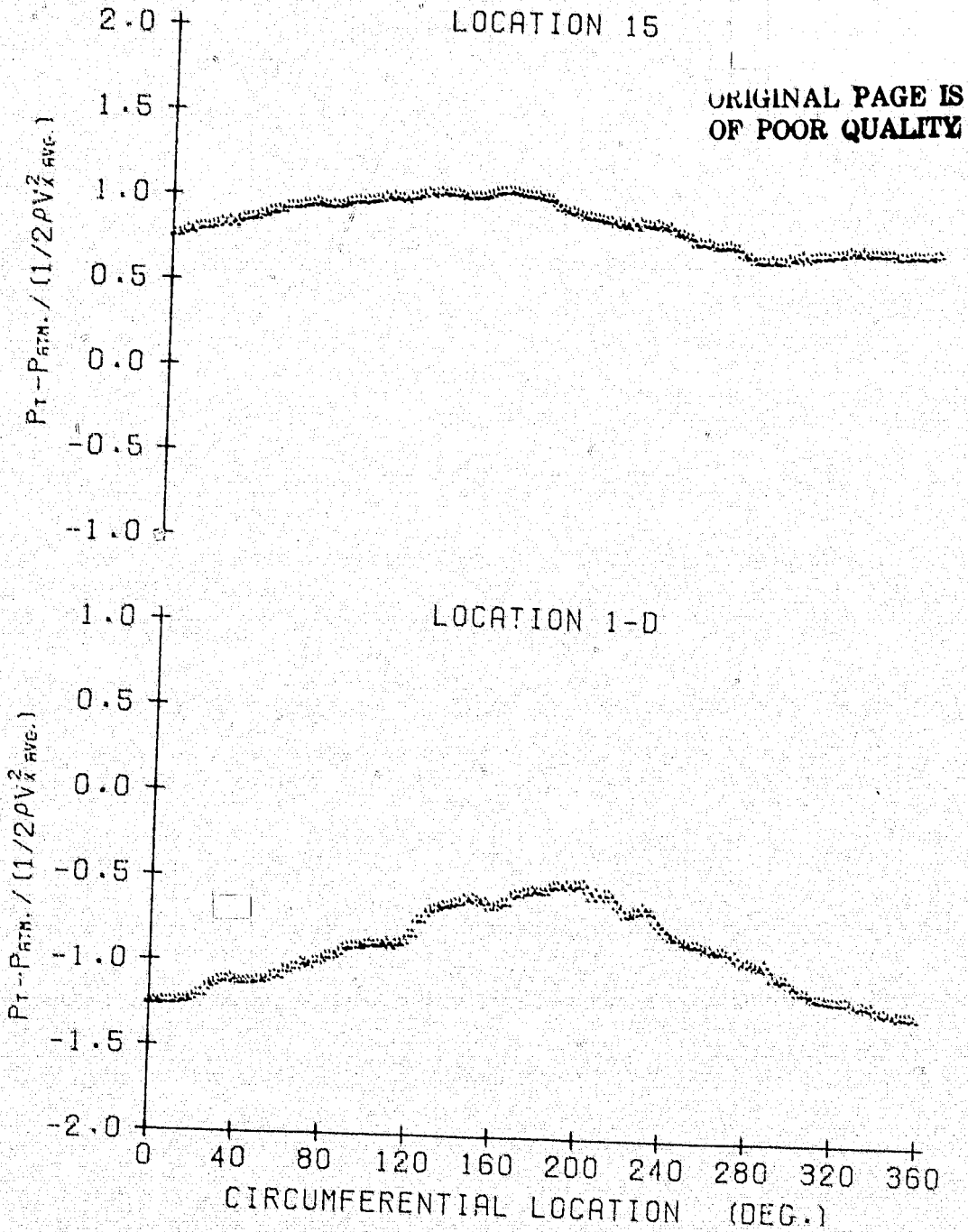


Figure B.10

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9 BLADES
50 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM = 1699

AVG. FLOW COEF. = 0.583
AVG. P-RISE COEF. = 1.775
AVG. INCIDENCE = 3.36 DEG.

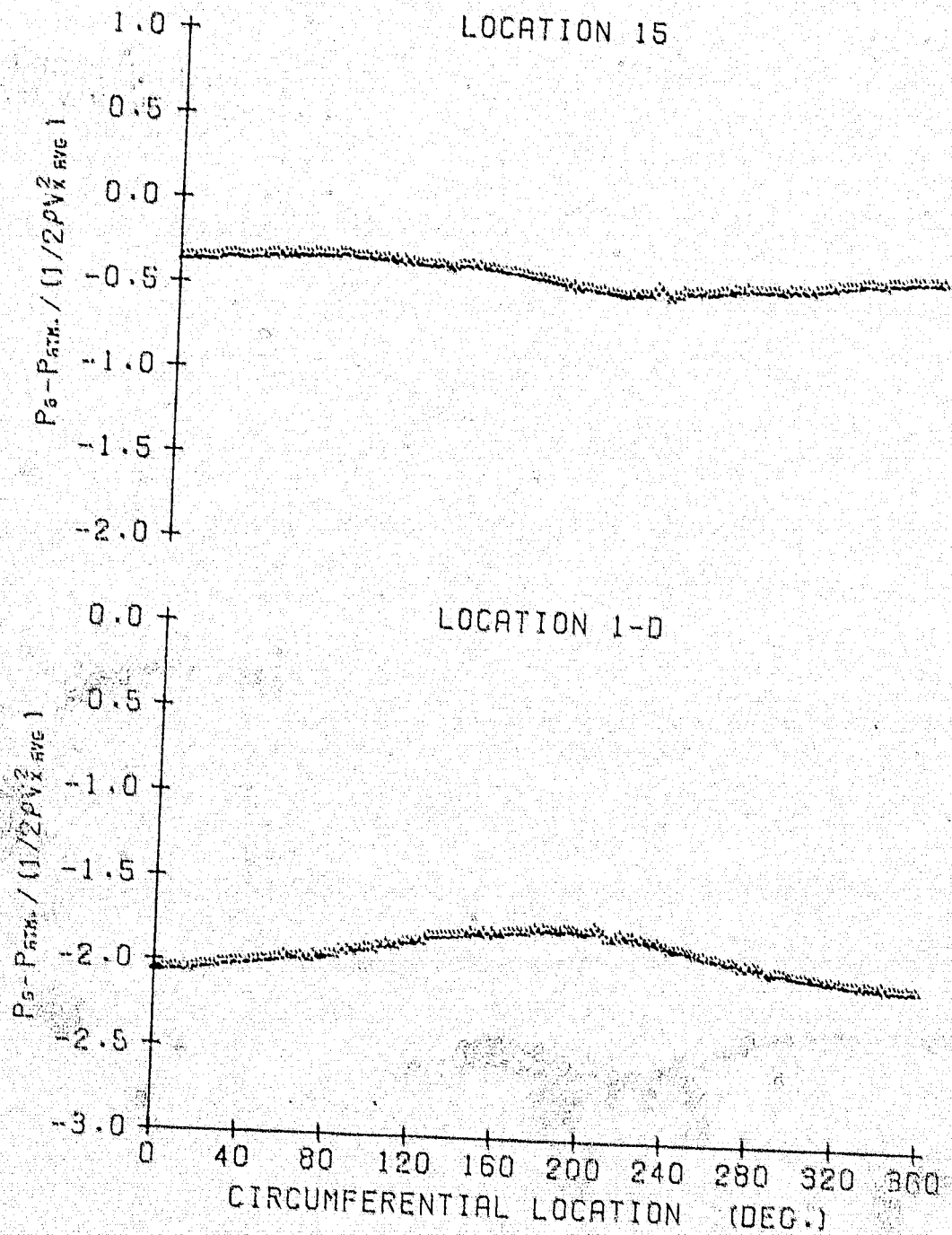


Figure B.11

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9 BLADES
50 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM = 1699

AVG. FLOW COEF. = 0.583
AVG. P-RISE COEF. = 1.775
AVG. INCIDENCE = 3.36 DEG.

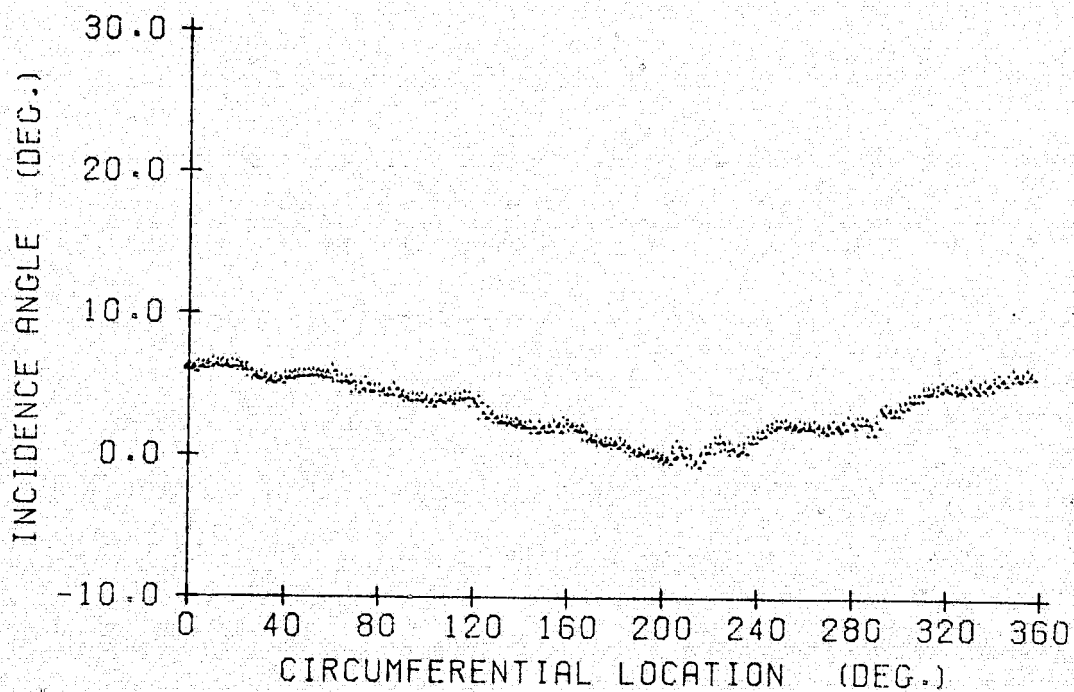


Figure B.12

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9 BLADES
50 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM = 1837

AVG. FLOW COEF. = 0.532
AVG. P-RISE COEF. = 2.444
AVG. INCIDENCE = 5.65 DEG.

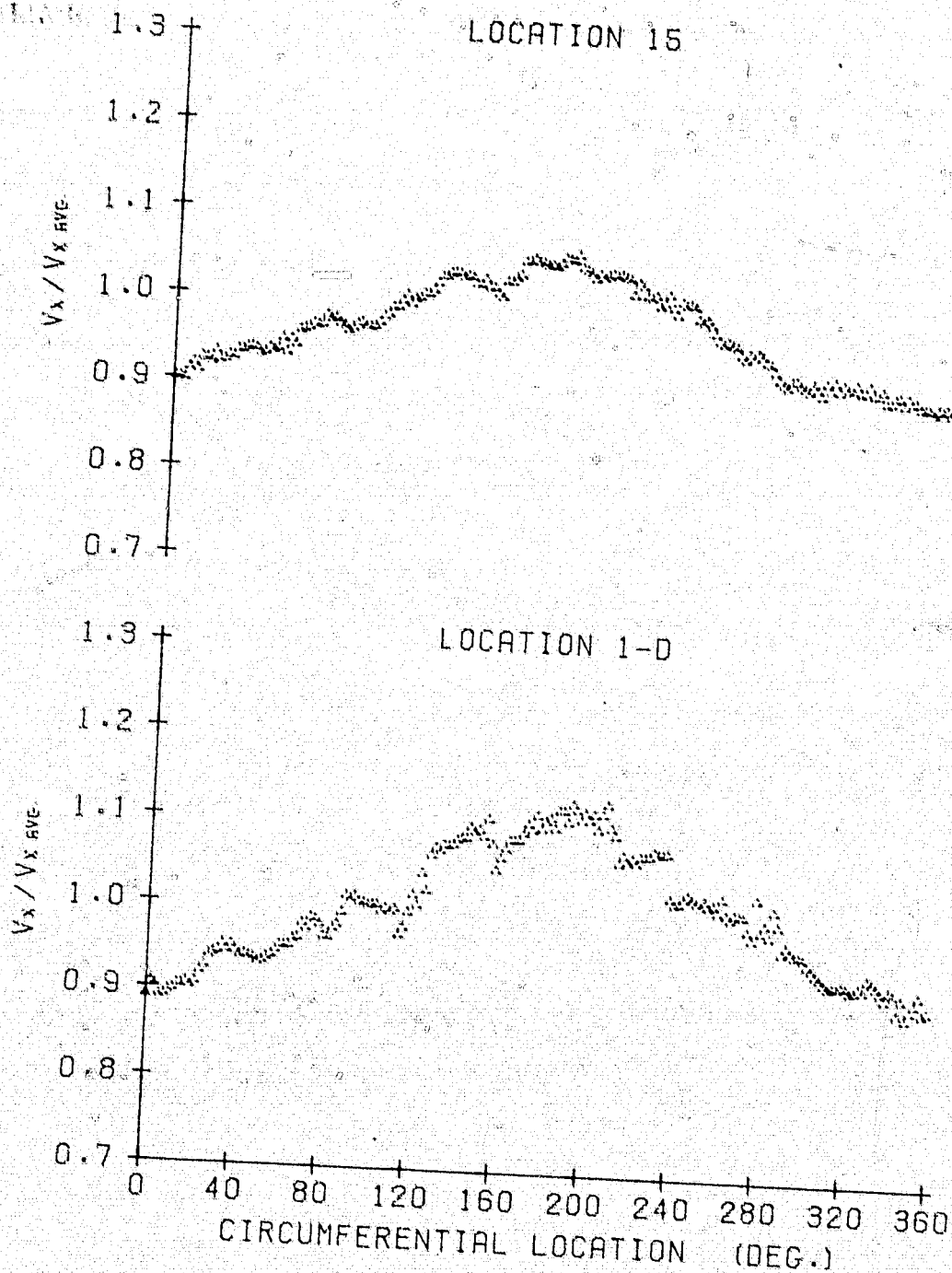


Figure B.13

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9 BLADES
50 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM = 1837

AVG. FLOW COEF. = 0.532
AVG. P-RISE COEF. = 2.444
AVG. INCIDENCE = 5.65 DEG.

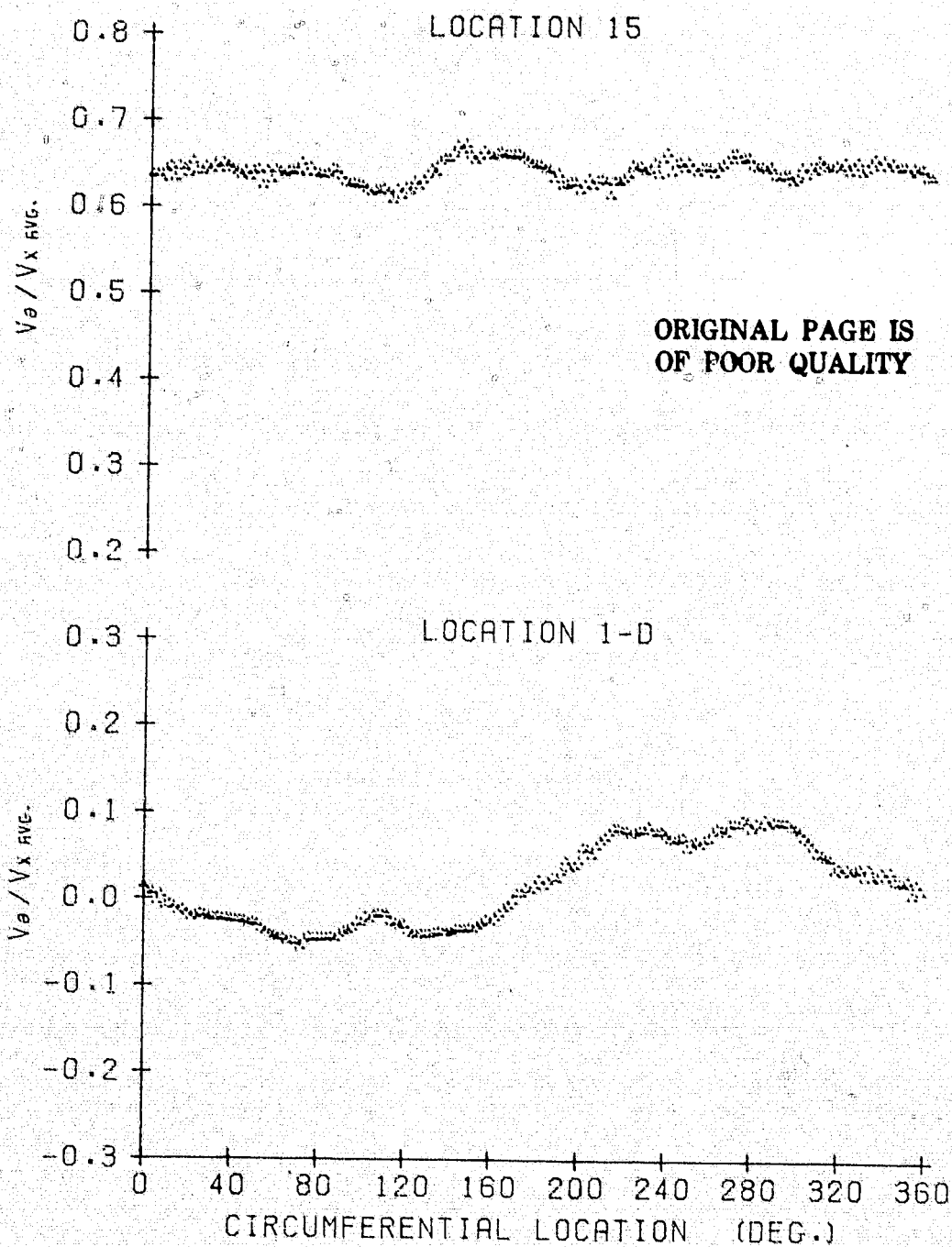


Figure B.14

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9 BLADES
50 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM = 1837

AVG. FLOW COEF. = 0.532
AVG. P-RISE COEF. = 2.444
AVG. INCIDENCE = 5.65 DEG.

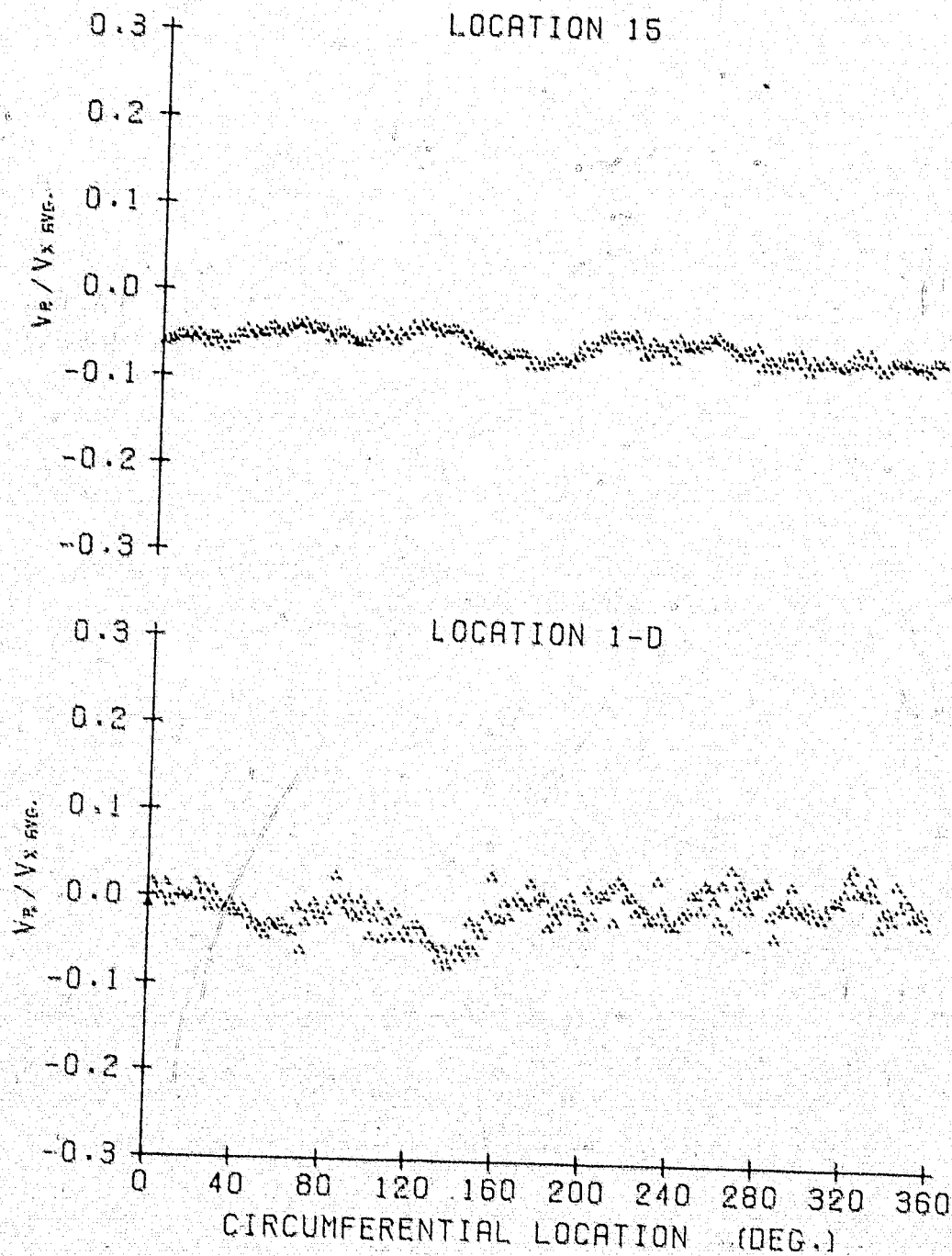


Figure B.15

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9 BLADES
50 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM = 1837

AVG. FLOW COEF. = 0.532
AVG. P-RISE COEF. = 2.444
AVG. INCIDENCE = 5.65 DEG.

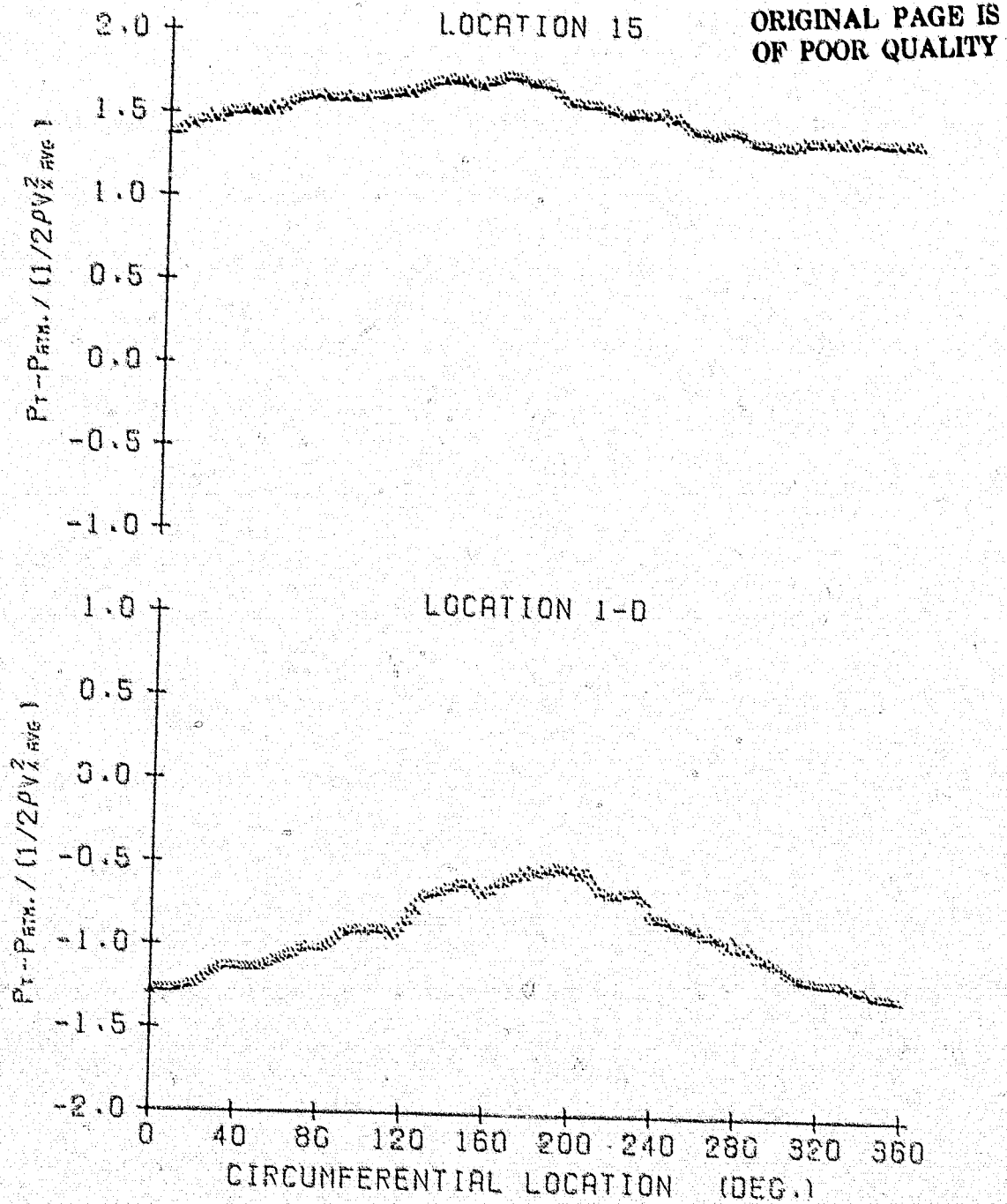


Figure B.16

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9 BLADES
50 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM = 1837

AVG. FLOW COEF. = 0.532
AVG. P-RISE COEF. = 2.444
AVG. INCIDENCE = 5.65 DEG.

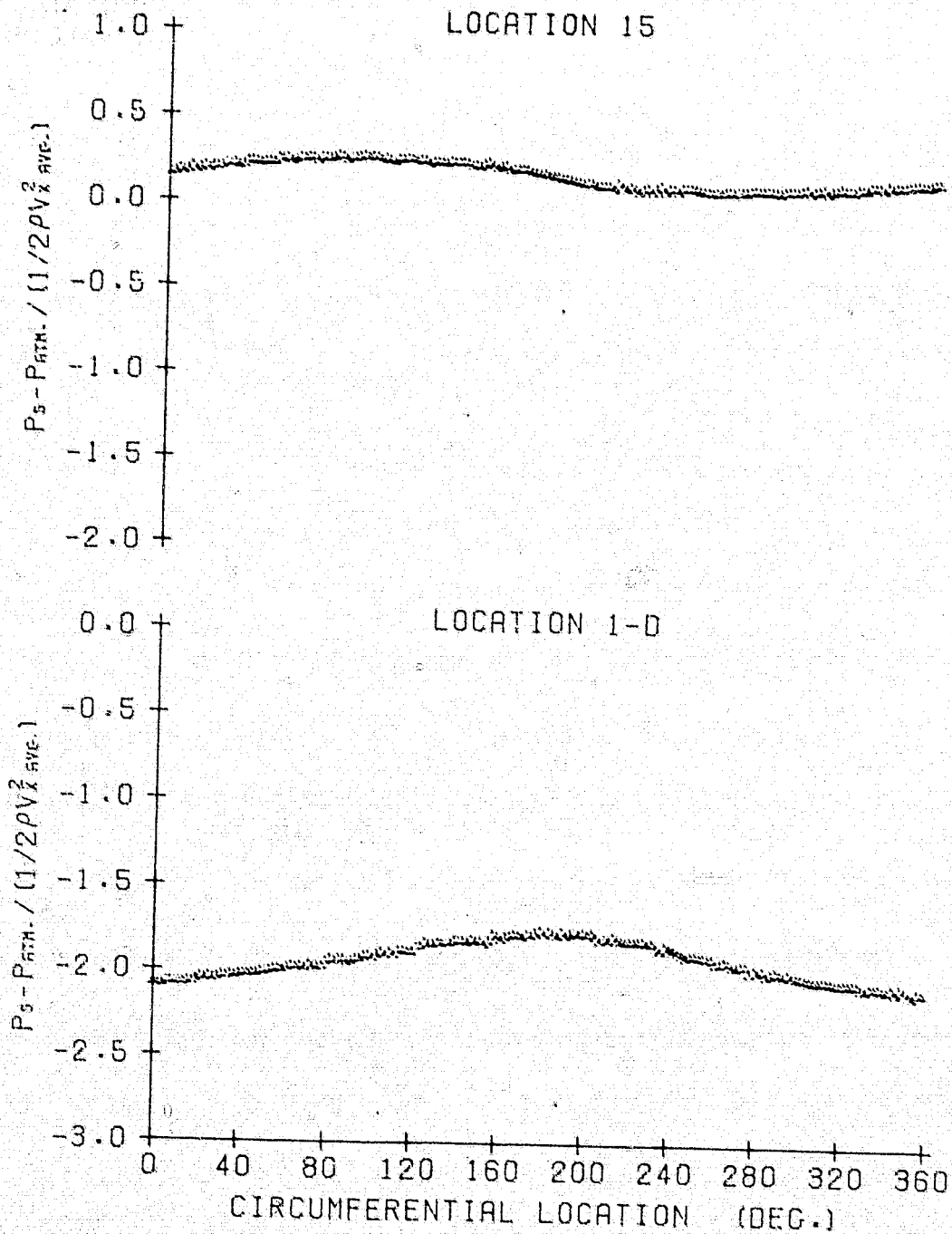


Figure B.17

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9 BLADES
50 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM = 1837

AVG. FLOW COEF. = 0.532
AVG. P-RISE COEF. = 2.444
AVG. INCIDENCE = 5.65 DEG.

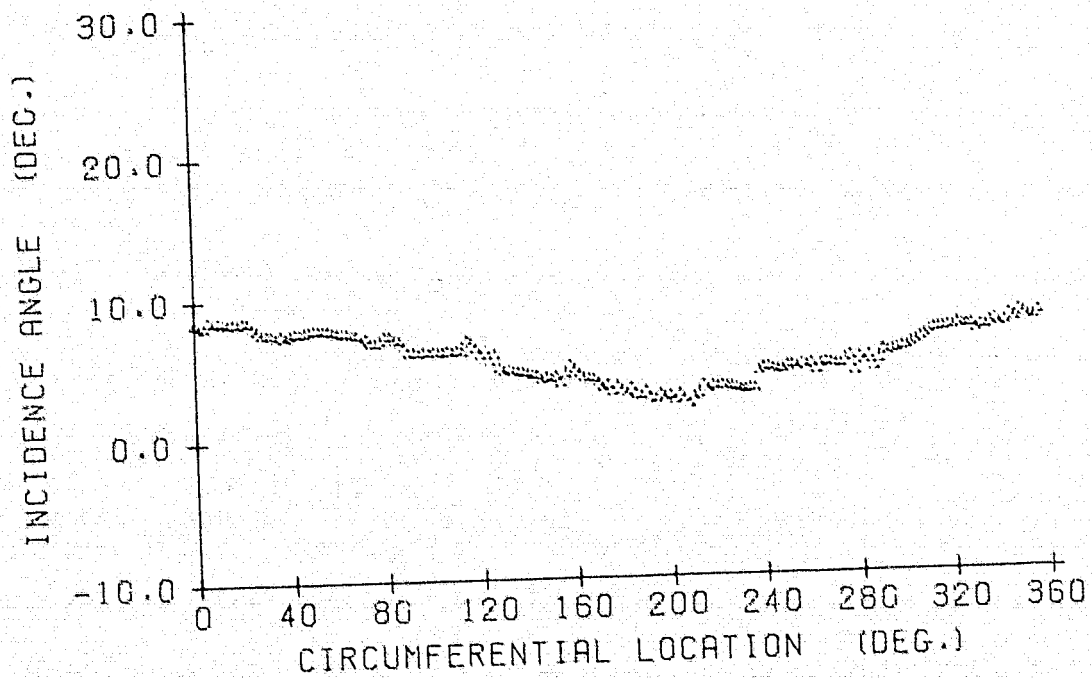


Figure B.18

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9 BLADES
50 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM = 1525

AVG. FLOW COEF. = 0.644
AVG. P-RISE COEF. = 1.117
AVG. INCIDENCE = 0.95 DEG.

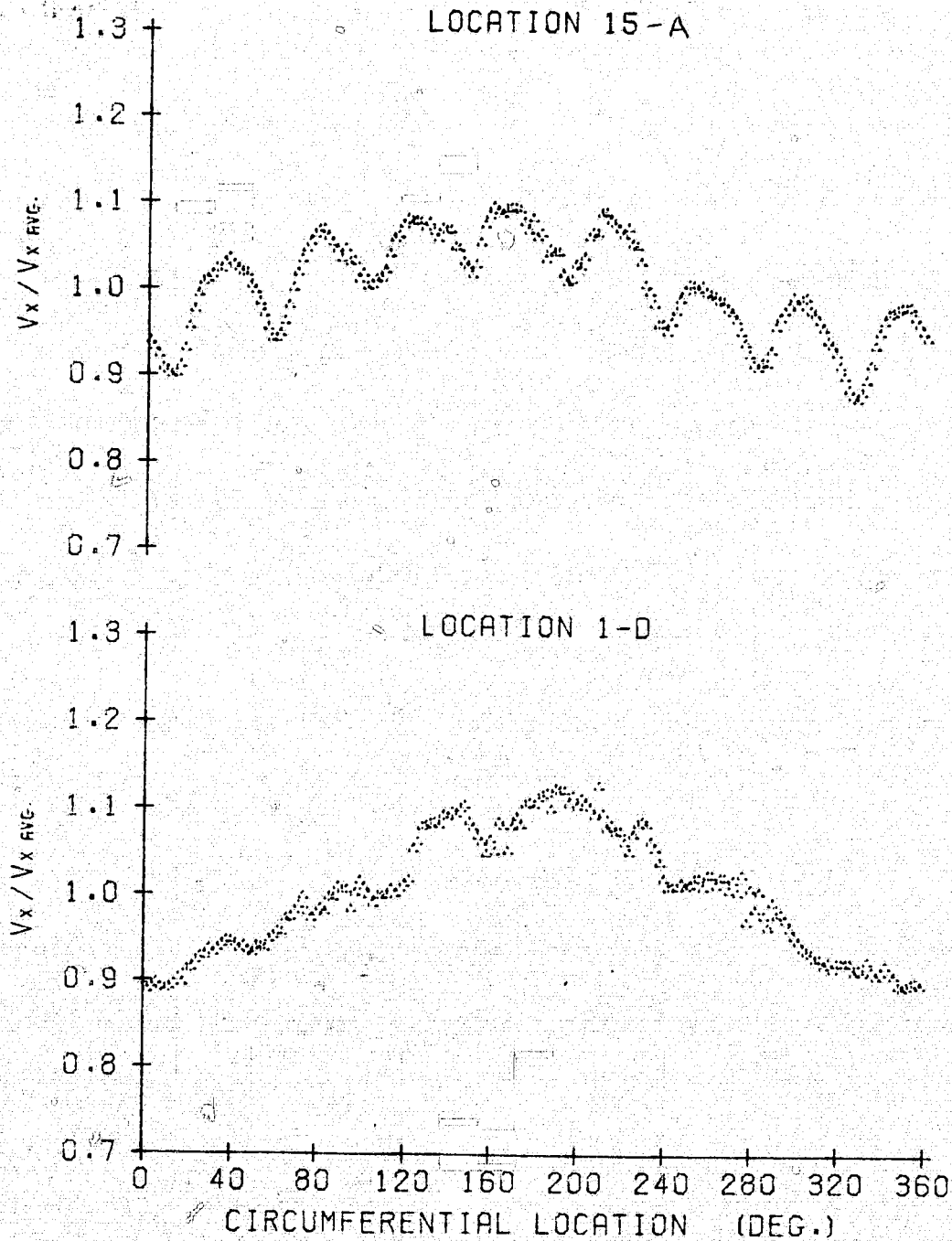


Figure B.19

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9 BLADES
50 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM = 1525

AVG. FLOW COEF. = 0.644
AVG. P-RISE COEF. = 1.117
AVG. INCIDENCE = 0.95 DEG.

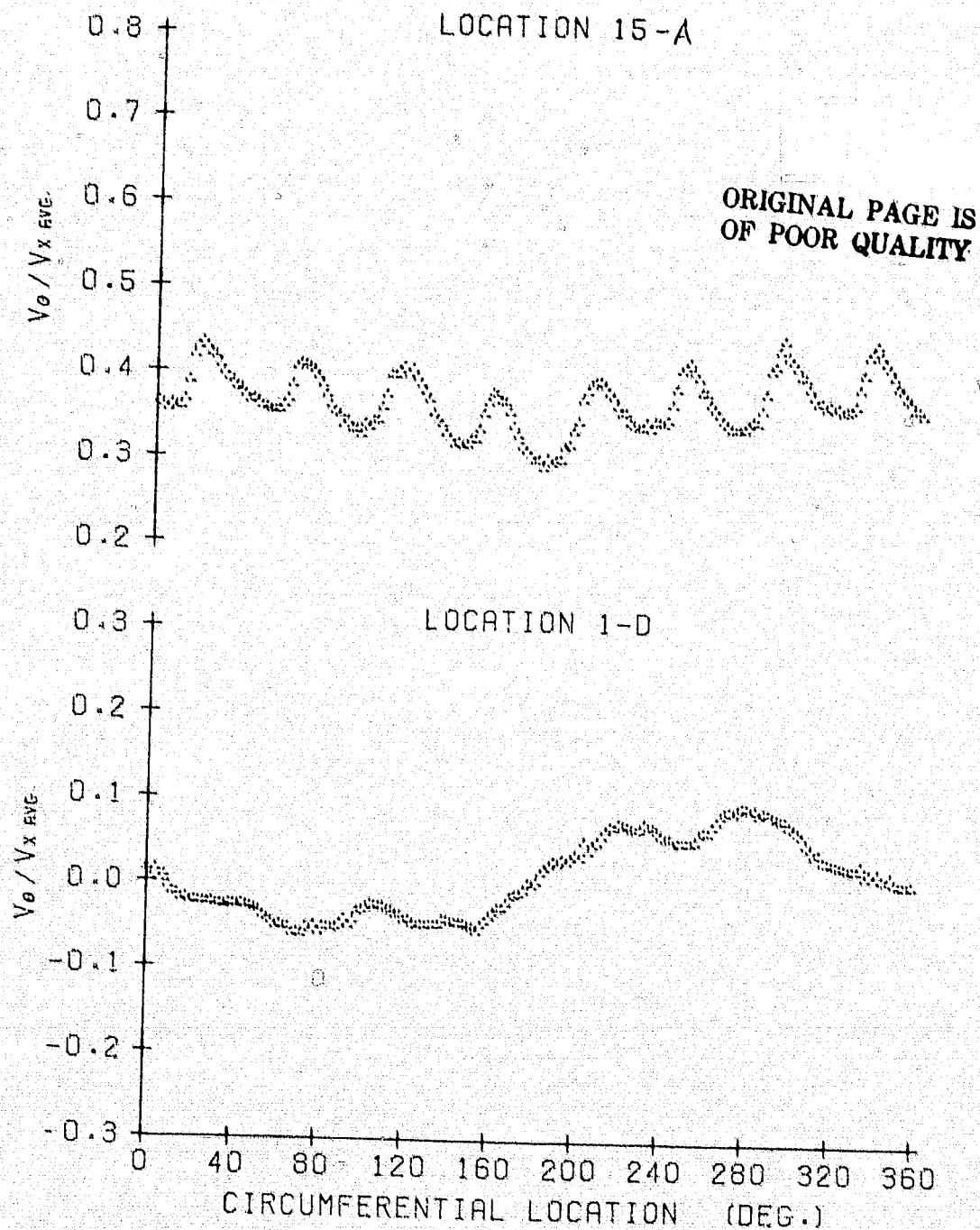


Figure B.20

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9 BLADES
50 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM = 1525

AVG. FLOW COEF. = 0.644
AVG. P-RISE COEF. = 1.117
AVG. INCIDENCE = 0.95 DEG.

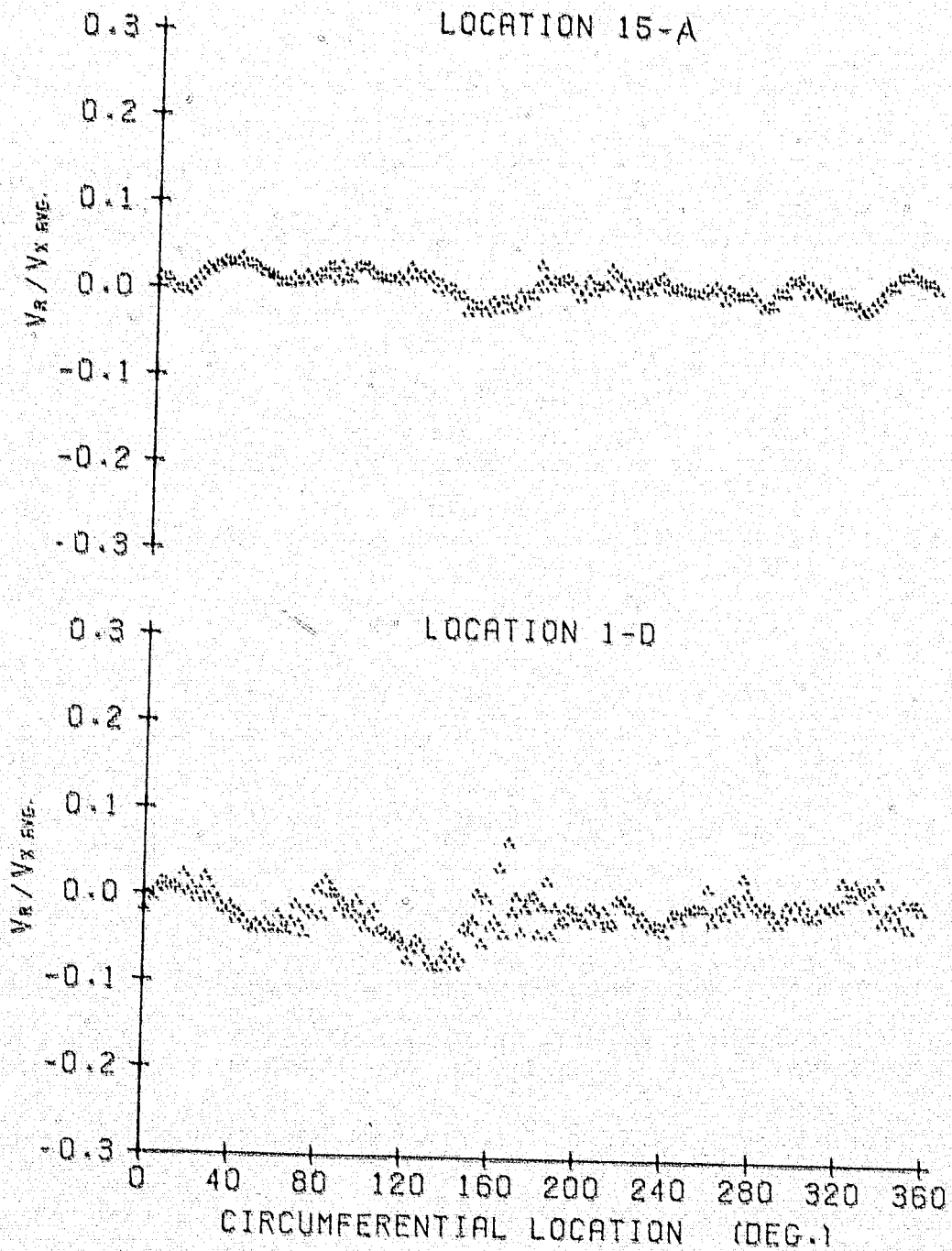


Figure B.21

10 October 1978
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9 BLADES
50 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM = 1525

AVG. FLOW COEF. = 0.644
AVG. P-RISE COEF. = 1.117
AVG. INCIDENCE = 0.95 DEG.

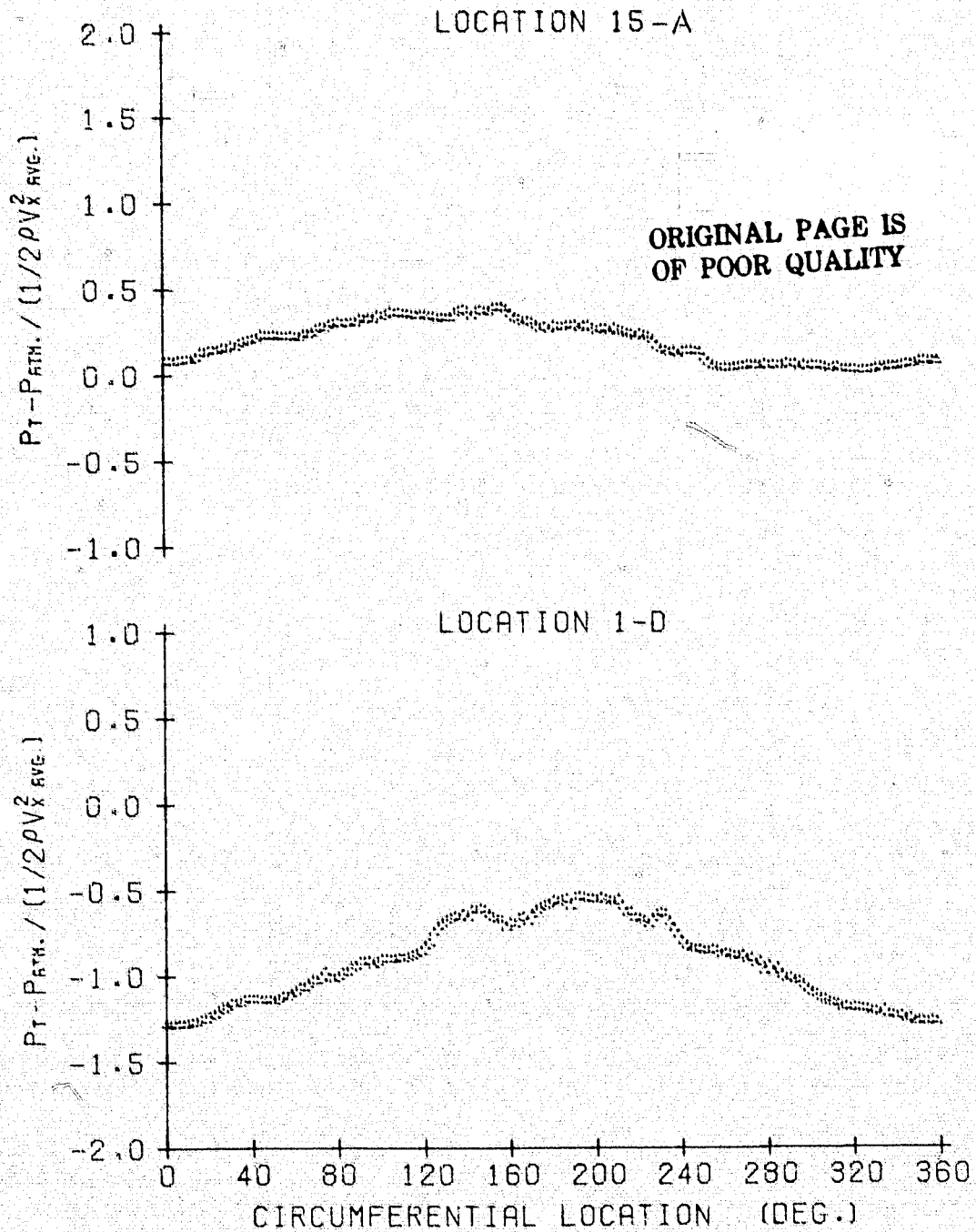


Figure B.22

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9 BLADES
50 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM = 1525

AVG. FLOW COEF. = 0.644
AVG. P-RISE COEF. = 1.117
AVG. INCIDENCE = 0.95 DEG.

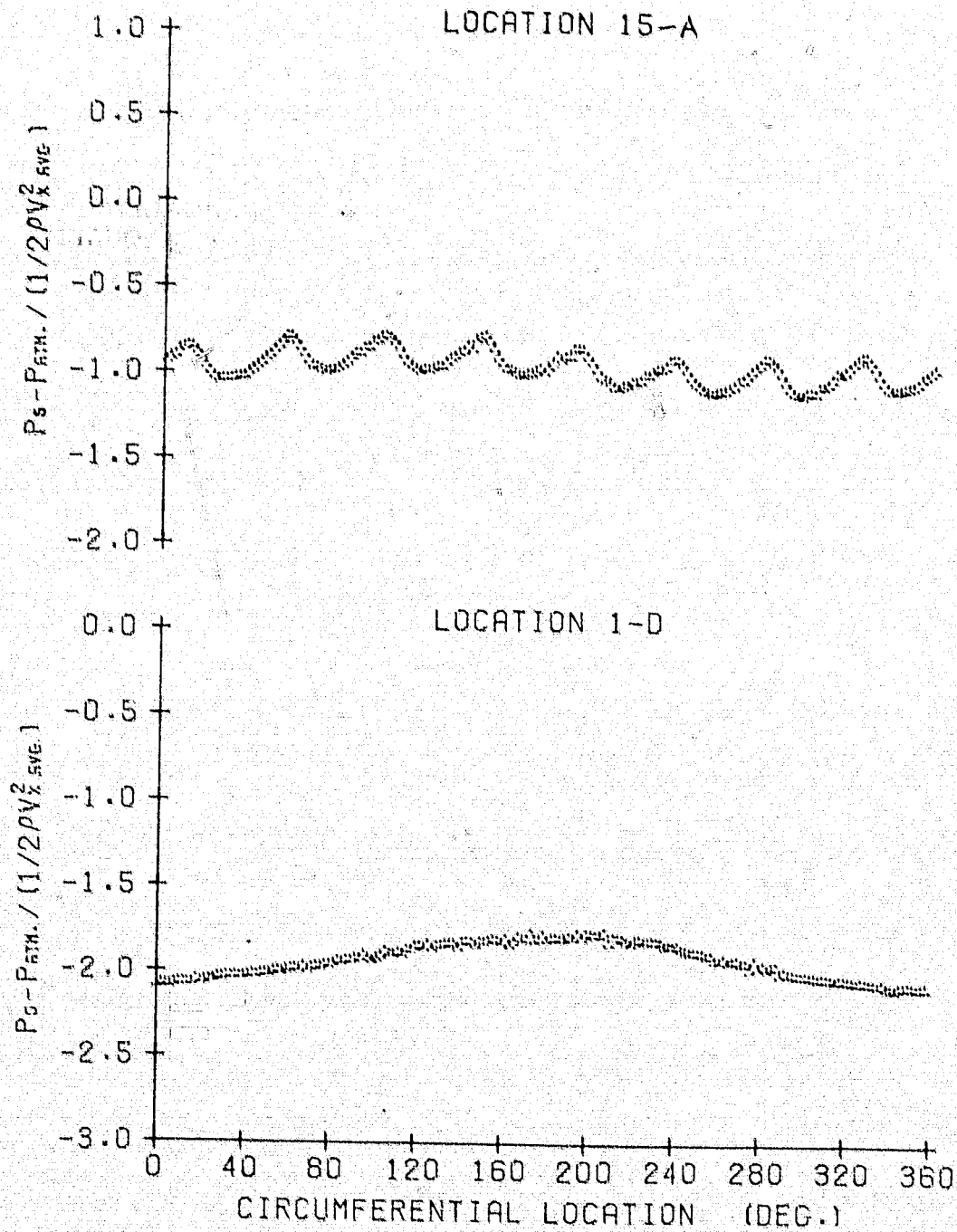


Figure B.23

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9 BLADES
50 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM = 1525

AVG. FLOW COEF. = 0.644
AVG. P-RISE COEF. = 1.117
AVG. INCIDENCE = 0.95 DEG.

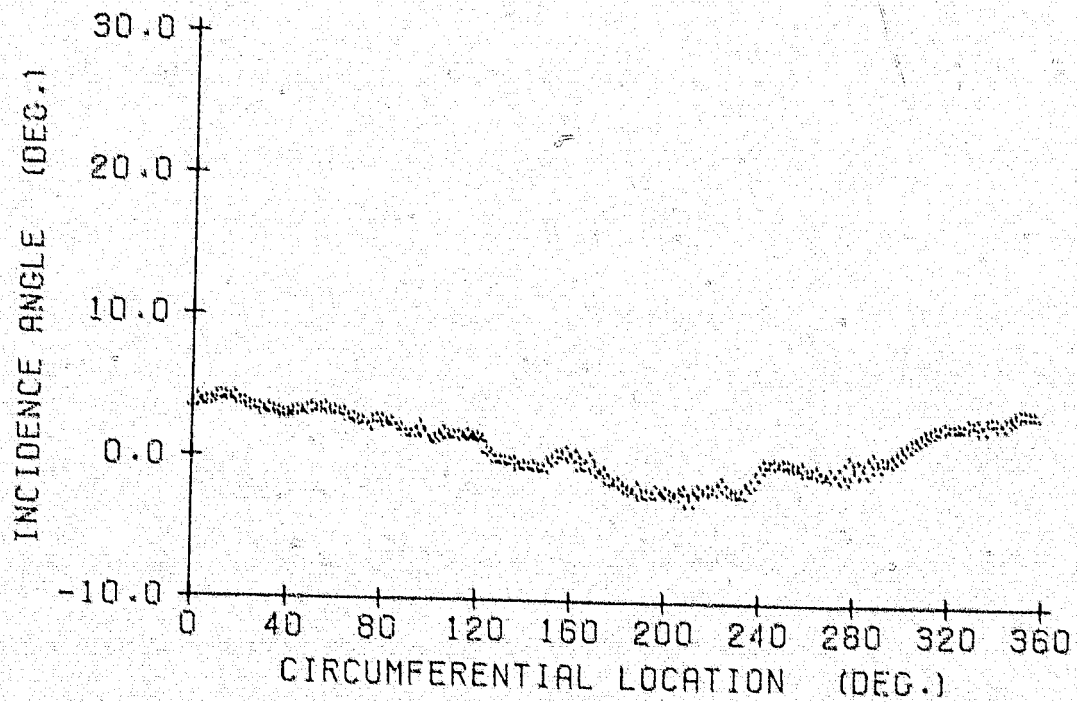


Figure B.24

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9 BLADES
50 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM = 1699

AVG. FLOW COEF. = 0.577
AVG. P-RISE COEF. = 1.825
AVG. INCIDENCE = 3.73 DEG.

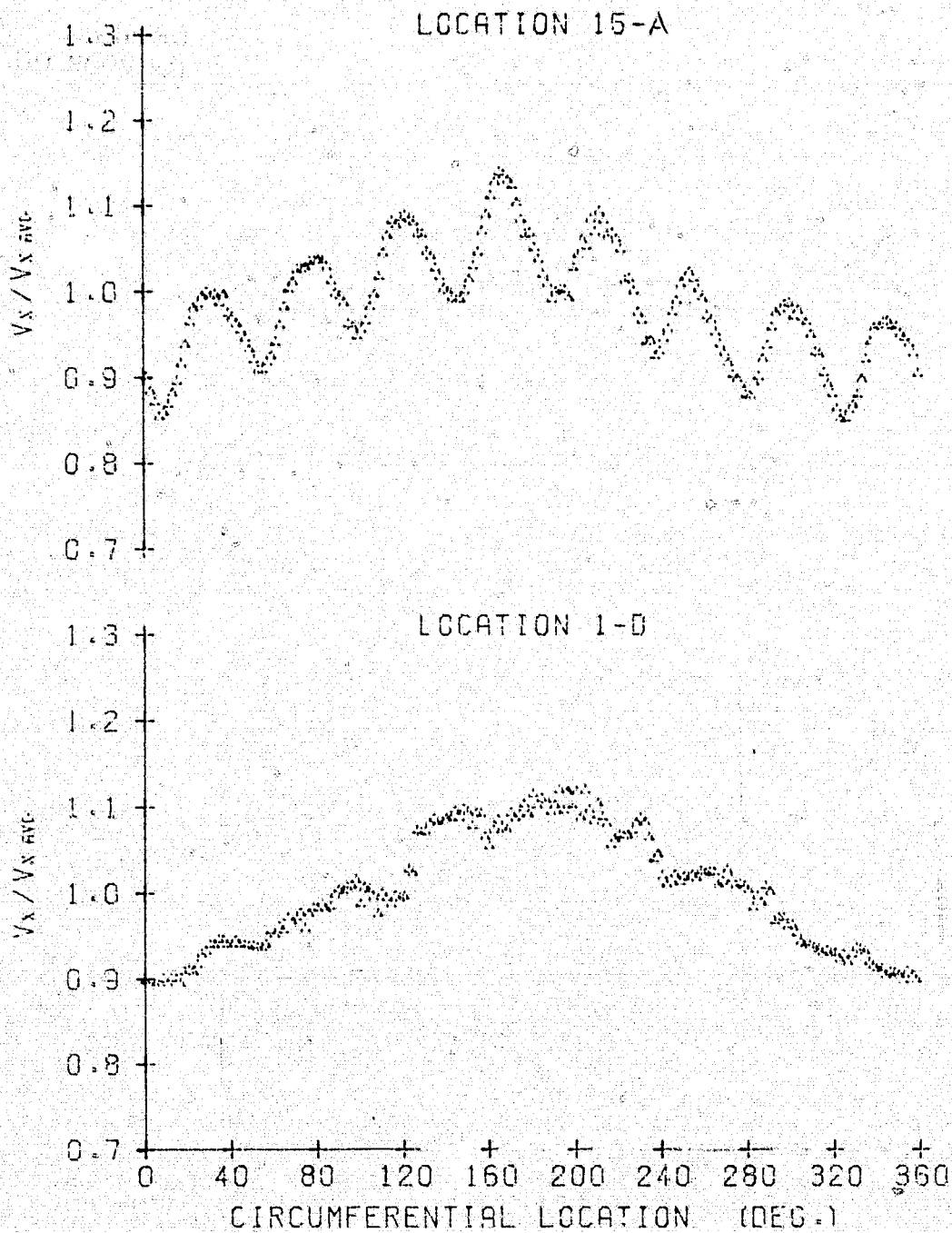


Figure B.25

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// 3 BLADES
50 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM = 1699

AVG. FLOW COEF. = 0.577
AVG. P-RISE COEF. = 1.925
AVG. INCIDENCE = 3.73 DEG.

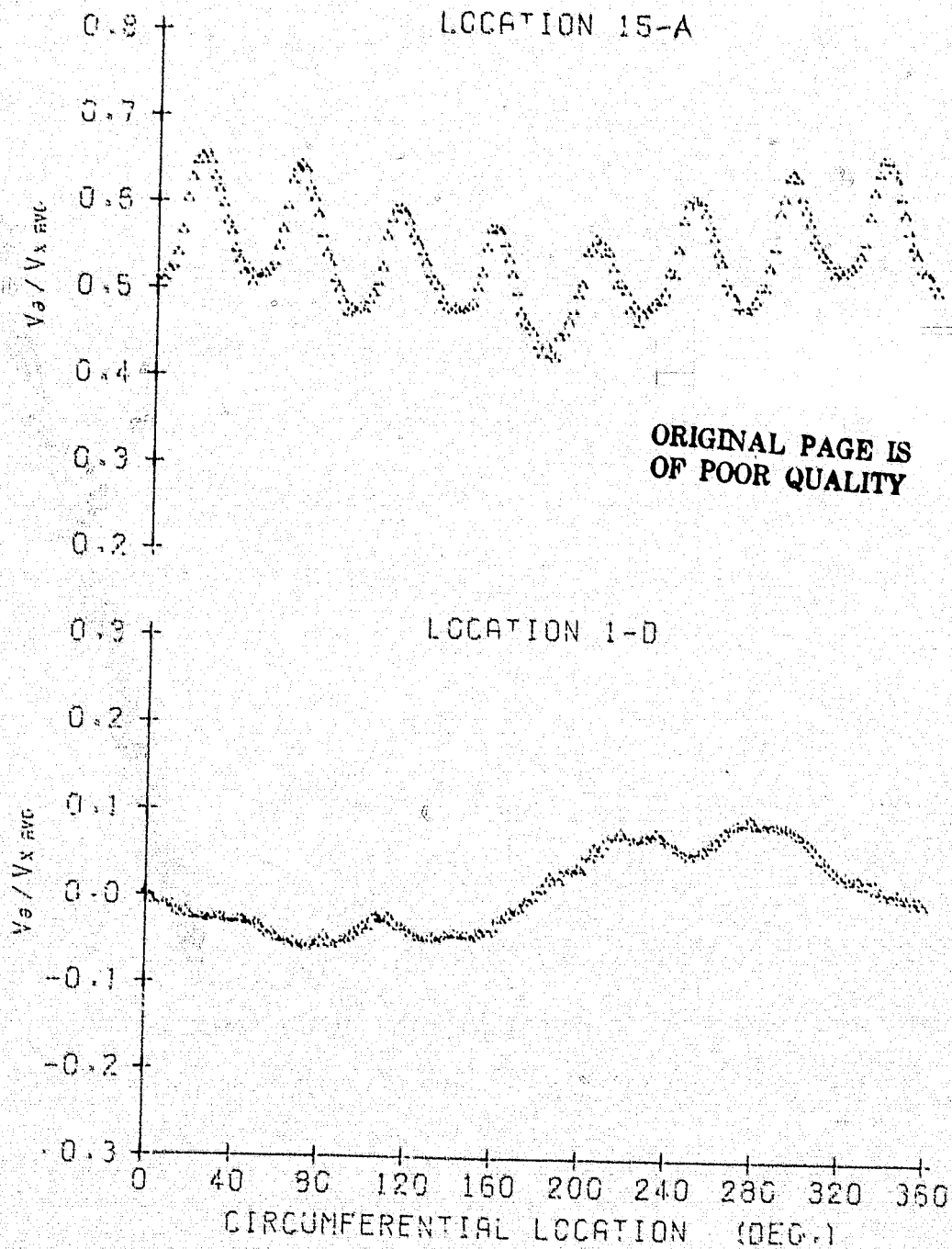


Figure B.26

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9 BLADES
50 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM = 1699

AVG. FLOW COEF. = 0.577
AVG. P-RISE COEF. = 1.825
AVG. INCIDENCE = 3.73 DEG.

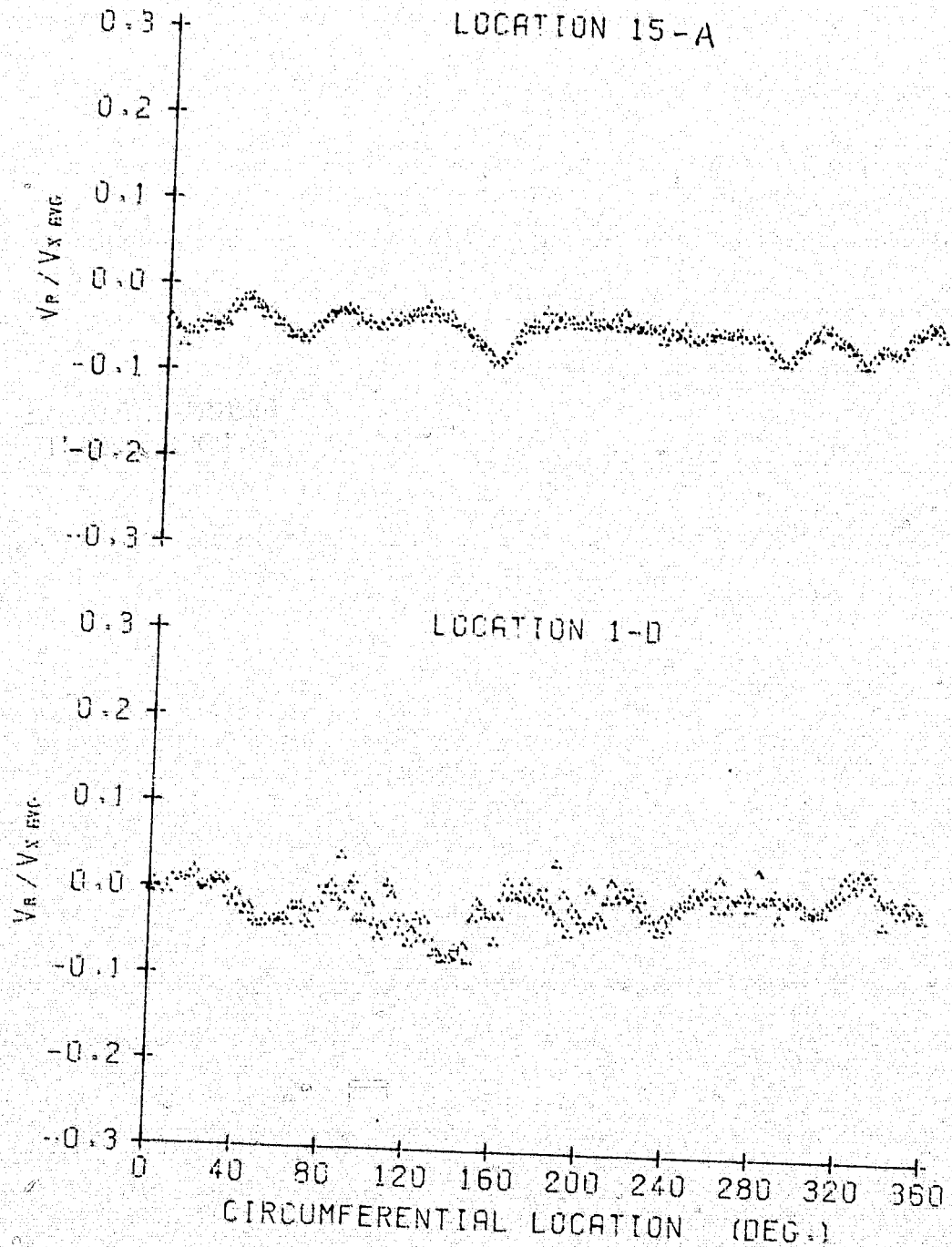


Figure B.27

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0 BLADES
50 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM = 1699

AVG. FLOW COEF. = 0.577
AVG. P-RISE COEF. = 1.825
AVG. INCIDENCE = 3.73 DEG.

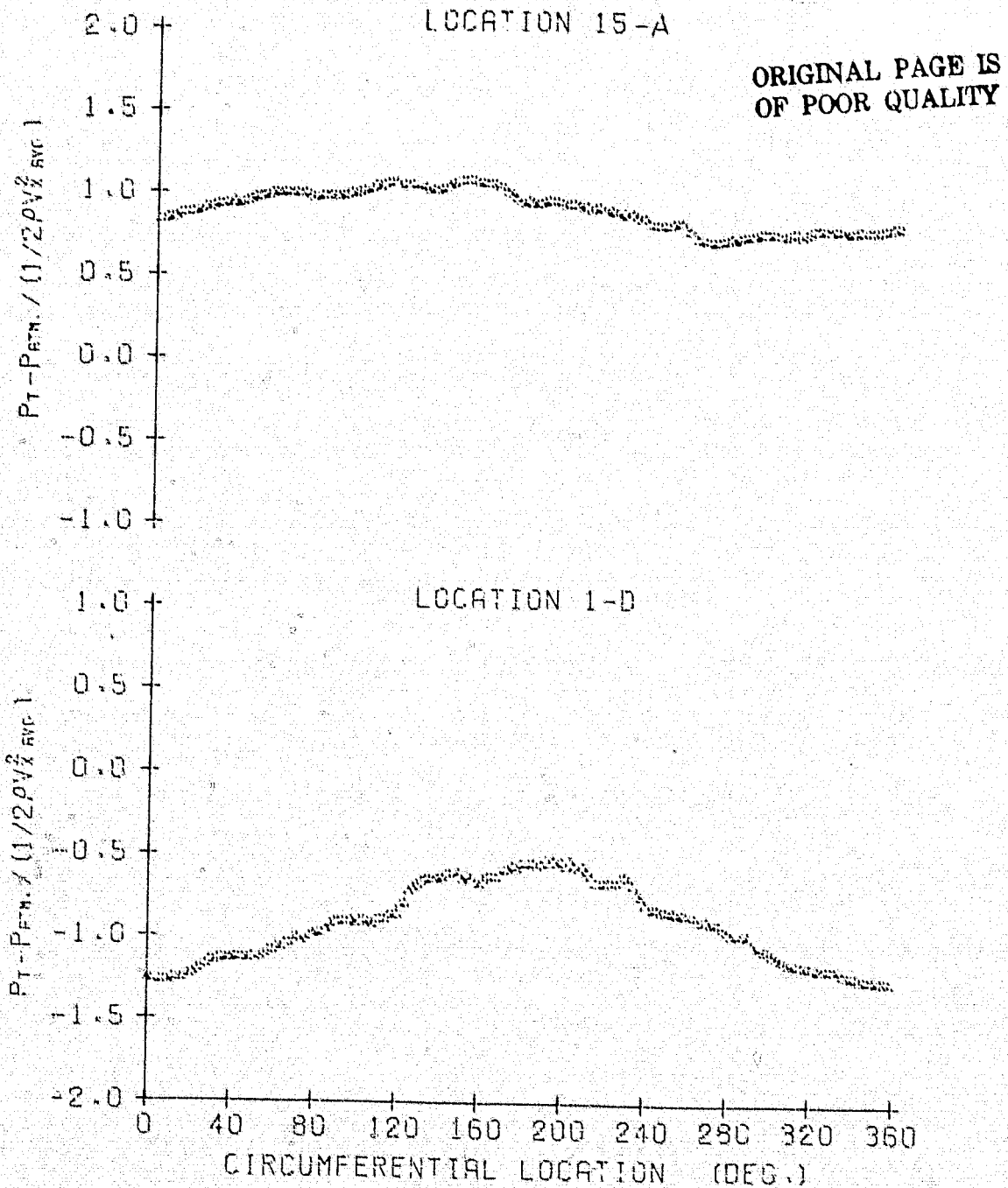


Figure B.28

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3 BLADES
50 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM = 1699

AVG. FLOW COEF. = 0.577
AVG. P-RISE COEF. = 1.925
AVG. INCIDENCE = 3.73 DEG.

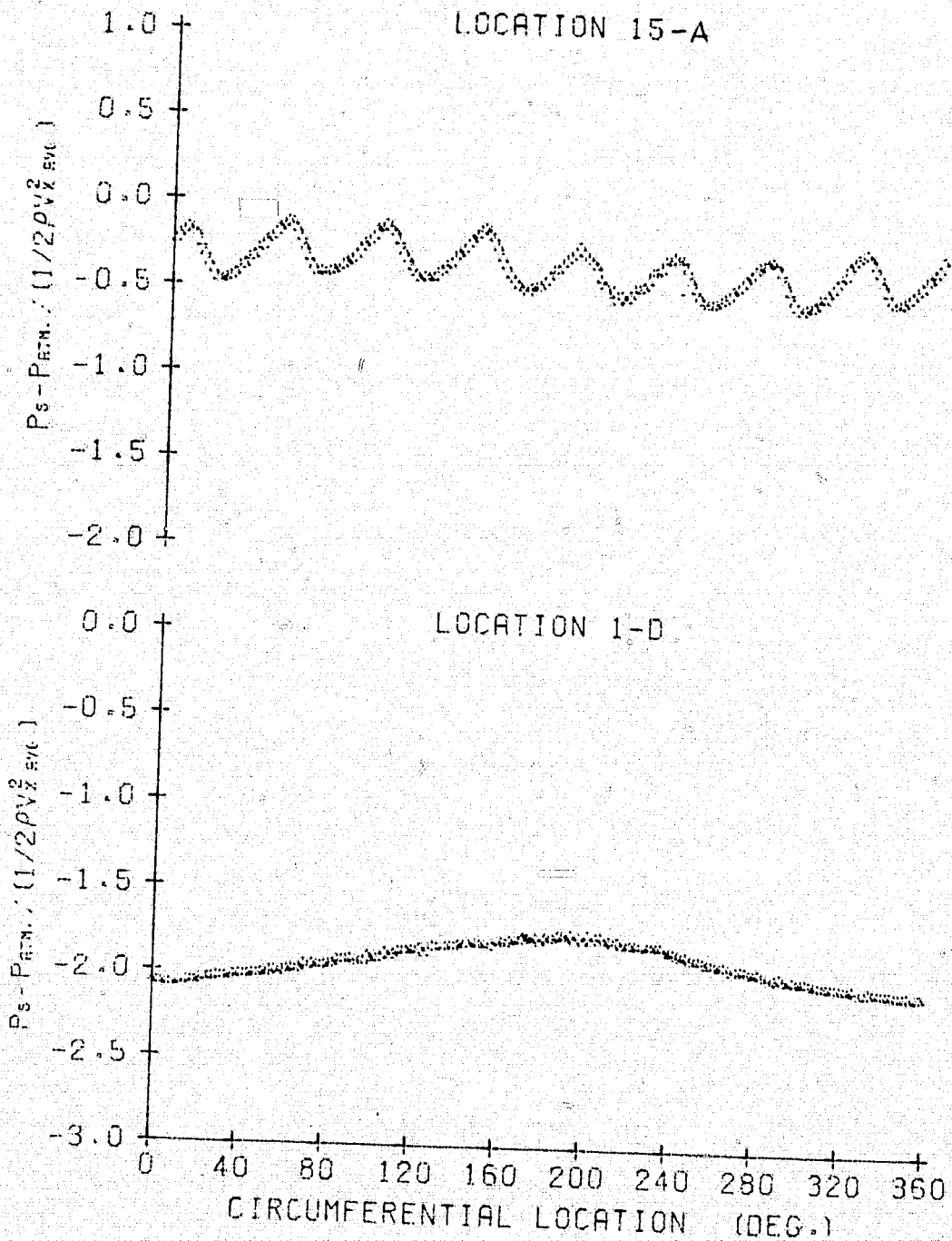


Figure B.29

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9 BLADES
50 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM = 1693

AVG. FLOW COEF. = 0.577
AVG. P-RISE COEF. = 1.825
AVG. INCIDENCE = 3.73 DEG.

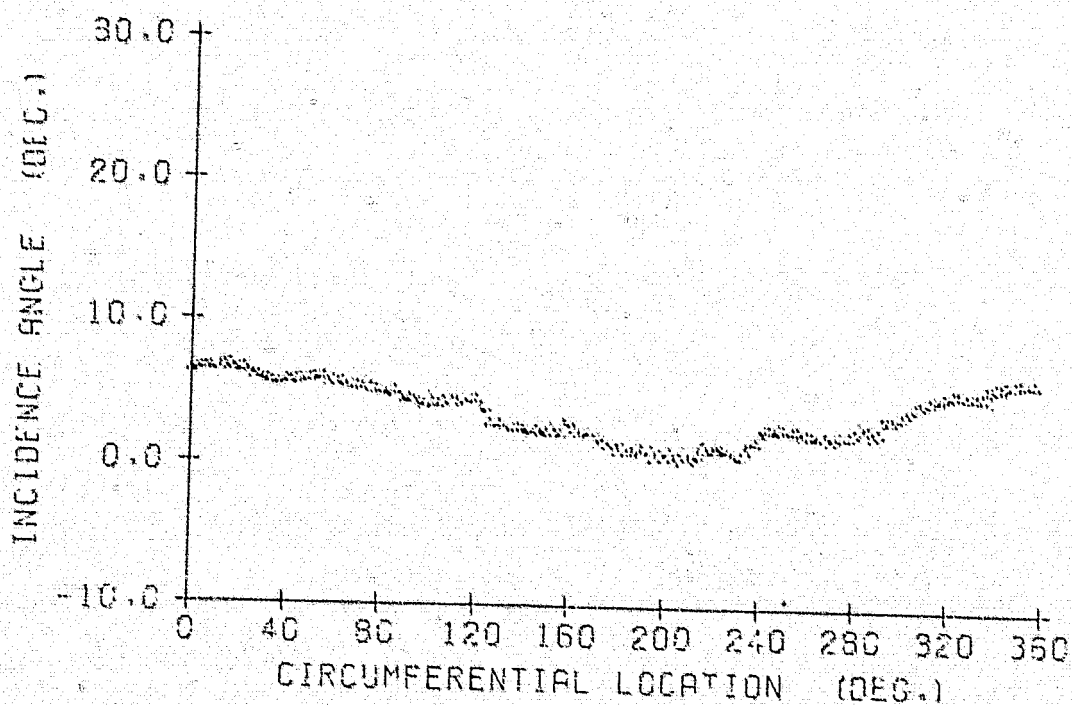


Figure B.30

10 October 1978
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9 BLADES
56 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM = 1837

AVG. FLOW COEF. = 0.532
AVG. P-RISE COEF. = 2.364
AVG. INCIDENCE = 5.72 DEG.

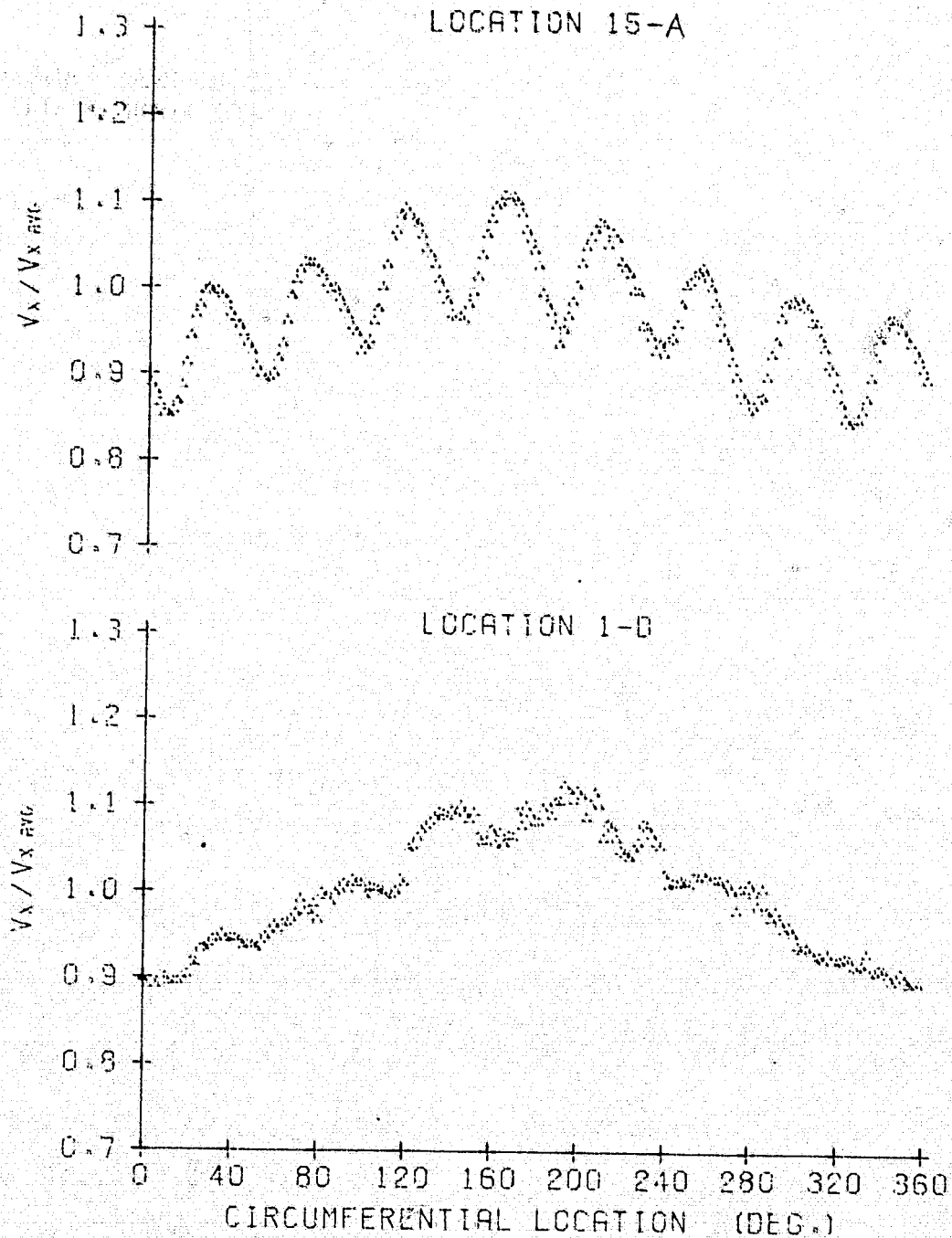


Figure B.31

10 October 1978
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9 BLADES
50 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM = 1837

AVG. FLOW COEF. = 0.532
AVG. P-RISE COEF. = 2.364
AVG. INCIDENCE = 5.72 DEG.

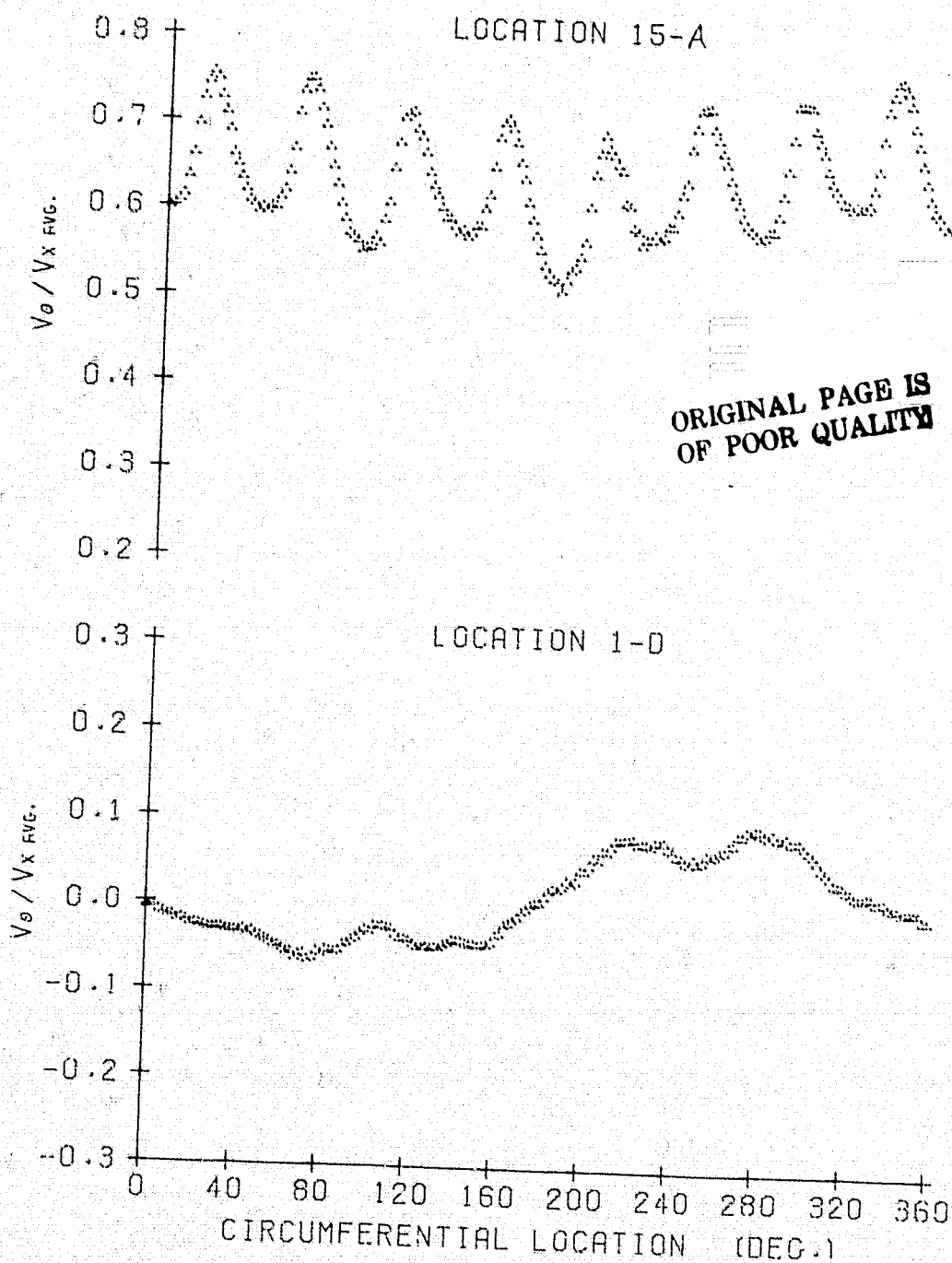


Figure B.32

10 October 1978
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9 BLADES
50 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM = 1837

AVG. FLOW COEF. = 0.532
AVG. P-RISE COEF. = 2.364
AVG. INCIDENCE = 5.72 DEG.

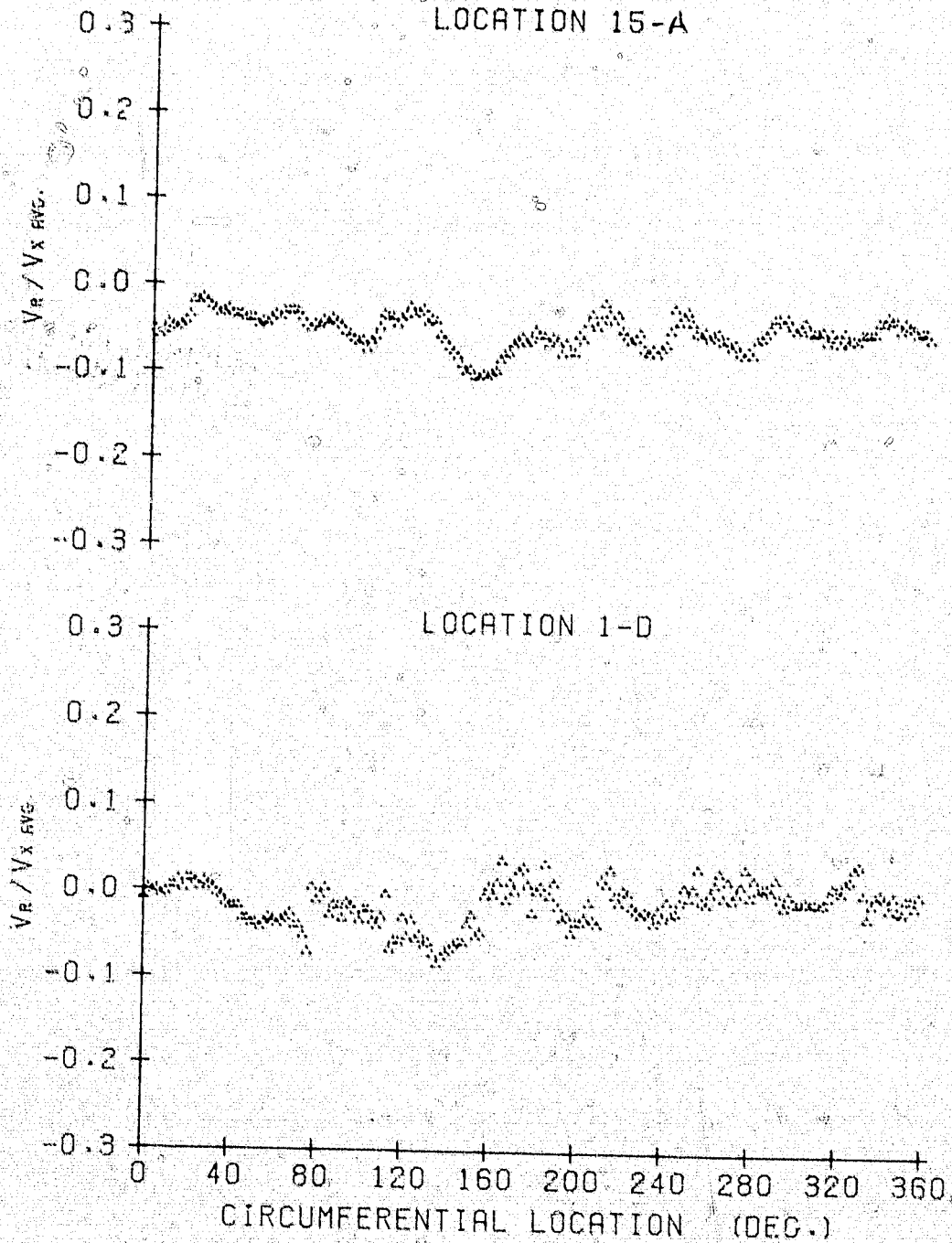


Figure B.33

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9 BLADES
50 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM = 1837

AVG. FLOW COEF. = 0.532
AVG. P-RISE COEF. = 2.364
AVG. INCIDENCE = 5.72 DEG.

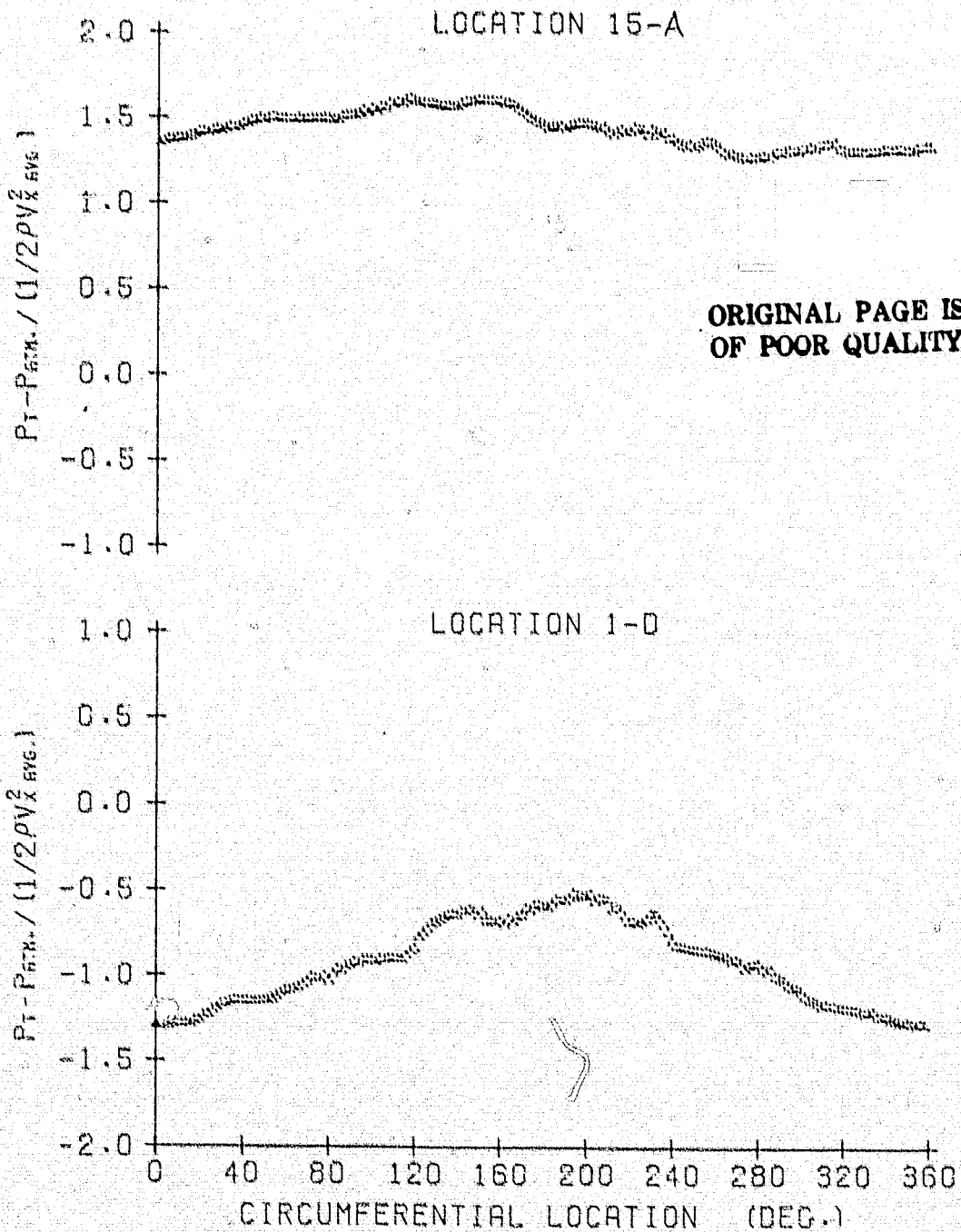


Figure B.34

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9 BLADES
50 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM = 1837

AVG. FLOW COEF. = 0.532
AVG. P-RISE COEF. = 2.364
AVG. INCIDENCE = 5.72 DEG.

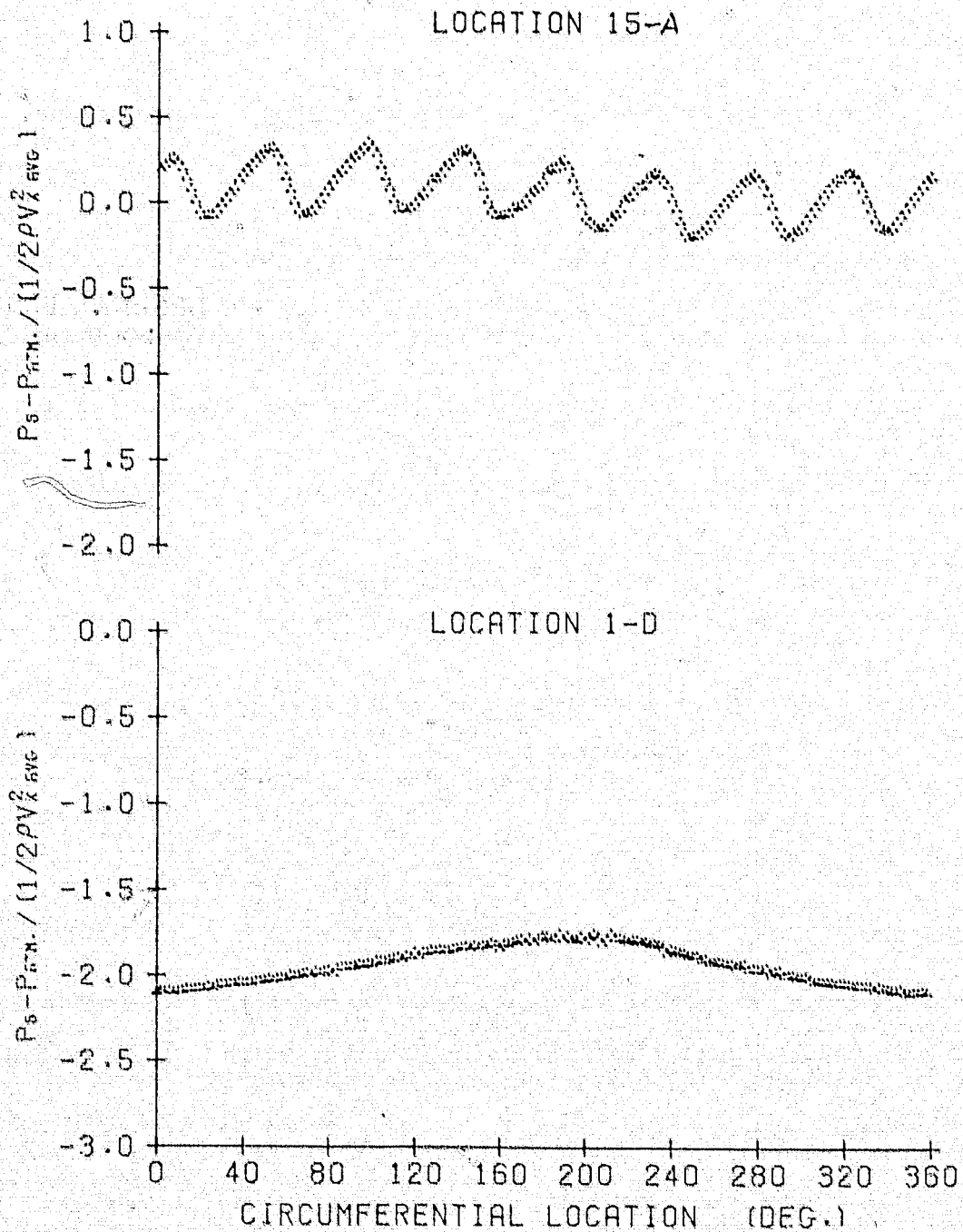


Figure B.35

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9 BLADES
50 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM = 1837

AVG. FLOW COEF. = 0.532
AVG. P-RISE COEF. = 2.364
AVG. INCIDENCE = 5.72 DEG.

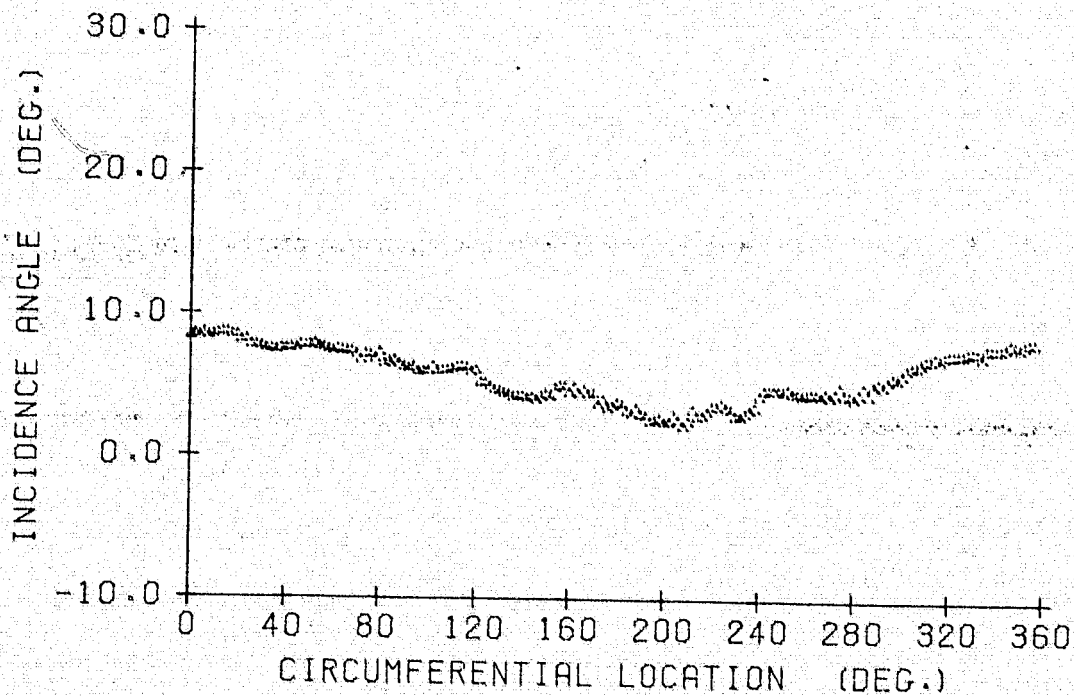


Figure B.36

Appendix C

Data for the Two-Cycle Sinusoidal Distortion

Table C.1

Test Conditions for the Two-Cycle Sinusoidal Distortion

Figure Numbers	Solidity	Rotor/Stator Spacing	Distance from Hub Surface
C.1-C.6	1.11	12 in. (30.48cm)	2.75 in. (6.985cm)
C.7-C.12	1.11	12 in.	2.75 in.
C.13-C.18	1.11	12 in.	2.75 in.
C.19-C.24	1.11	3 in. (7.62cm)	2.75 in.
C.25-C.30	1.11	3 in.	2.75 in.
C.31-C.36	1.11	3 in.	2.75 in.
C.37-C.42	0.90	12 in.	4.58 in. (11.64cm)
C.43-C.48	0.99	12 in.	3.67 in. (9.31cm)
C.49-C.54	1.26	12 in.	1.83 in. (4.66cm)
C.55-C.60	1.45	12 in.	0.92 in. (2.33cm)

Table C.1 (con't)

Test Conditions for the Two-Cycle Sinusoidal Distortion

Figure Numbers	No. of Blades	Stagger Angle (degrees)	$V_{xavginlet}$ (ft/sec)	$V_{xavgexit}$ (ft/sec)	RPM	Average ϕ	Average $\Delta P_T / \frac{1}{2} \rho V_{xavg}^2$	Average Incidence (degrees)
C.1-C.6	9	50	65.94	64.34	1529	0.638	1.188	1.18
C.7-C.12	9	50	65.05	64.02	1704	0.564	1.960	4.28
C.13-C.18	9	50	64.40	61.63	1842	0.517	2.623	6.40
C.19-C.24	9	50	65.37	66.80	1529	0.632	1.210	1.56
C.25-C.30	9	50	65.14	63.28	1704	0.565	1.910	4.37
C.31-C.36	9	50	64.04	62.08	1842	0.514	2.639	6.64
C.37-C.42	9	50	61.89	62.69	1704	0.537	2.289	5.59
C.43-C.48	9	50	62.99	61.83	1704	0.547	2.131	5.22
C.49-C.54	9	50	65.37	63.59	1704	0.567	1.882	4.22
C.55-C.60	9	50	61.42	62.96	1704	0.533	2.059	5.81

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9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1529

AVG. FLOW COEF. = 0.638
AVG. P-RISE COEF. = 1.188
AVG. INCIDENCE = 1.18 DEG.

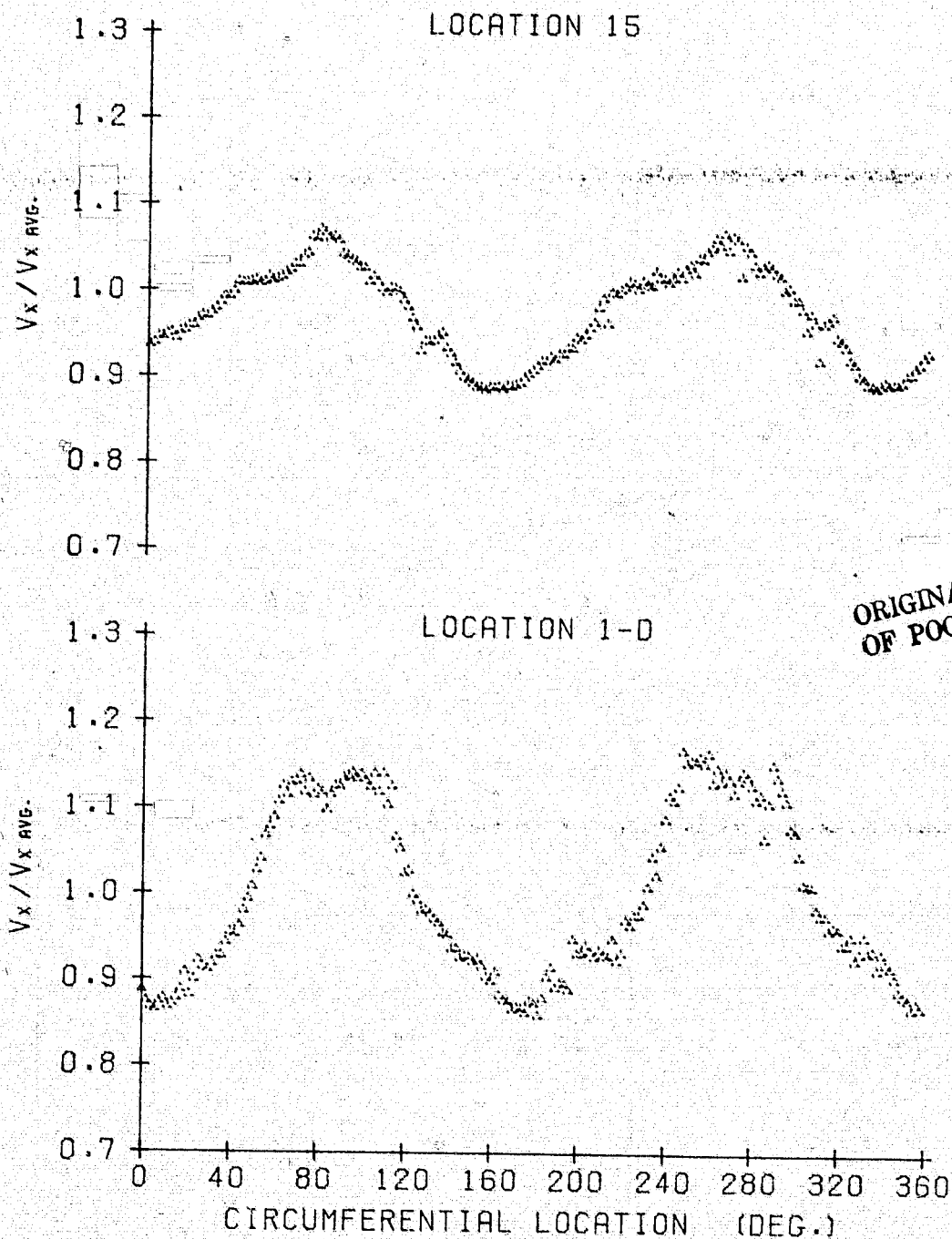


Figure C.1

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1529

AVG. FLOW COEF. = 0.638
AVG. P-RISE COEF. = 1.188
AVG. INCIDENCE = 1.18 DEG.

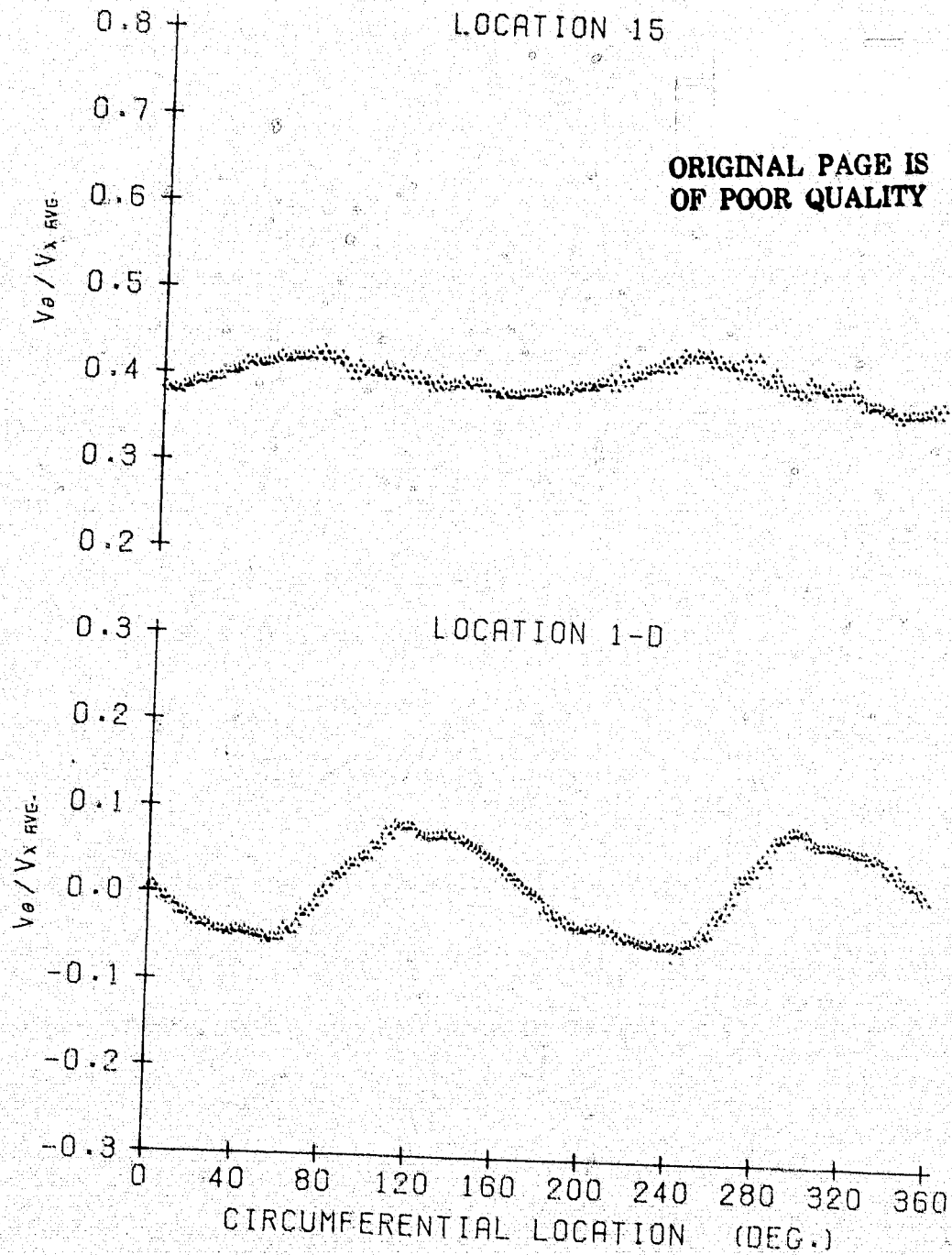


Figure C.2

10 October 1978

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9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1529

AVG. FLOW COEF. = 0.638
AVG. P-RISE COEF. = 1.188
AVG. INCIDENCE = 1.18 DEG.

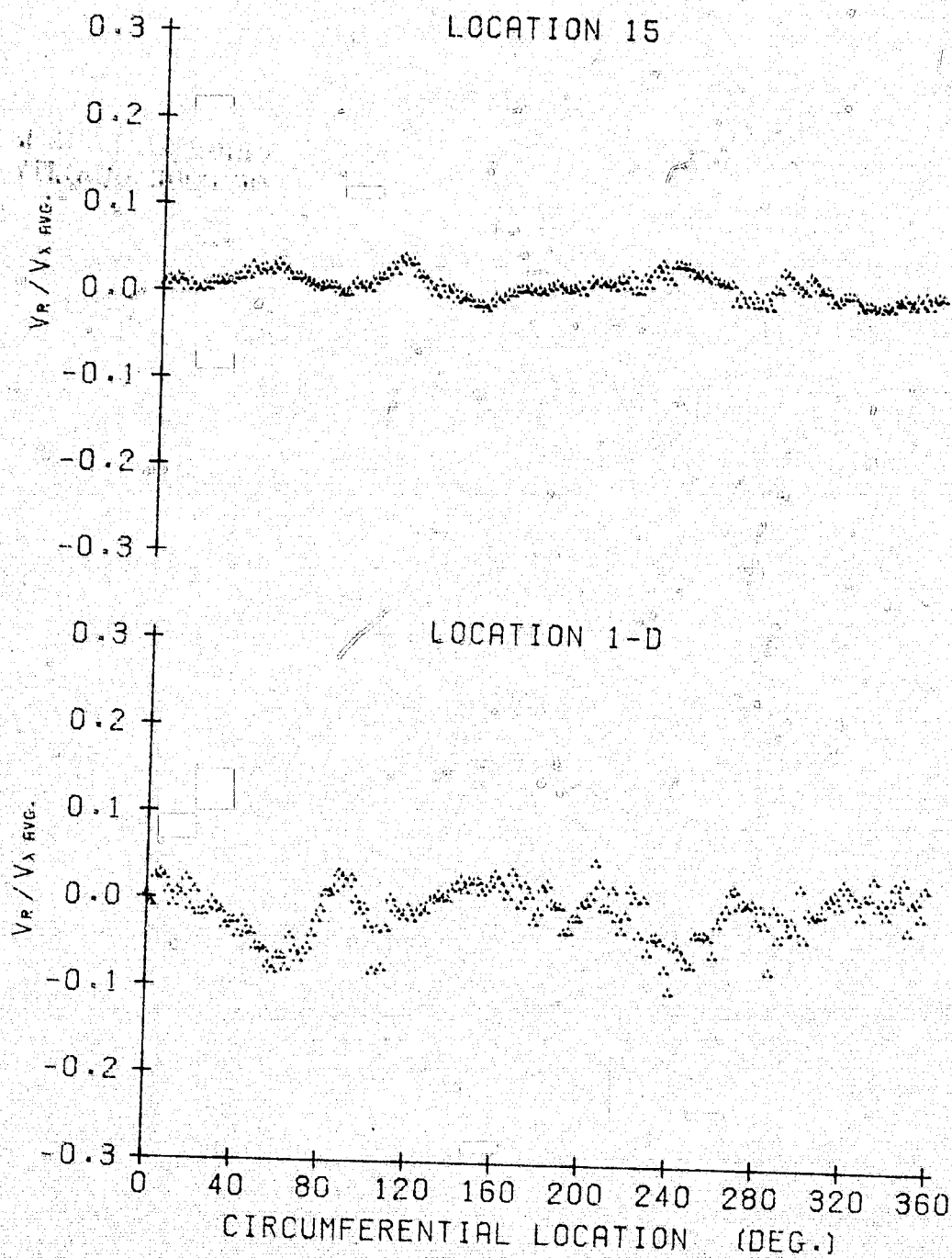


Figure C.3

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9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1529

AVG. FLOW COEF. = 0.638
AVG. P-RISE COEF. = 1.188
AVG. INCIDENCE = 1.18 DEG.

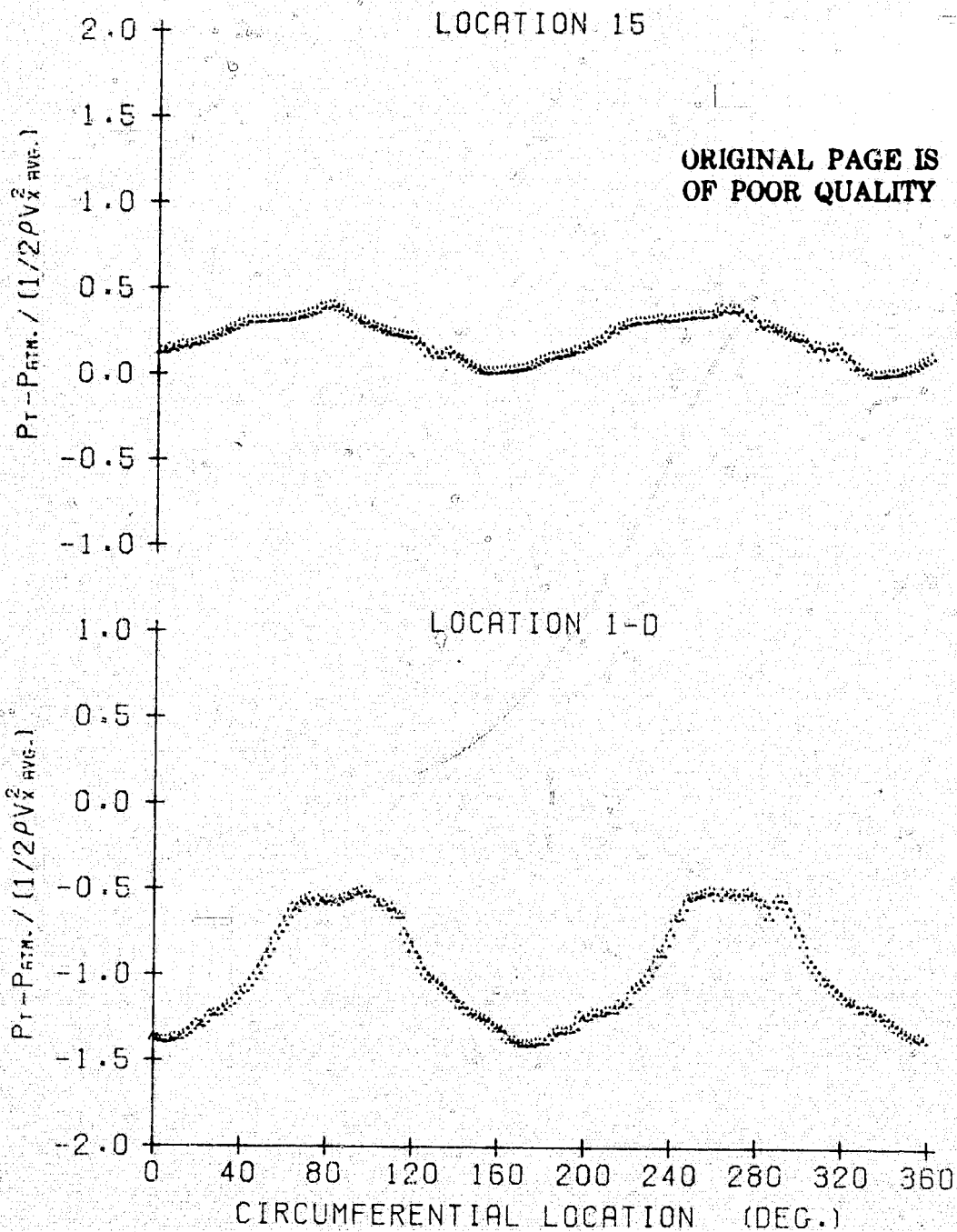


Figure C.4

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1529

AVG. FLOW COEF. = 0.638
AVG. P-RISE COEF. = 1.188
AVG. INCIDENCE = 1.18 DEG.

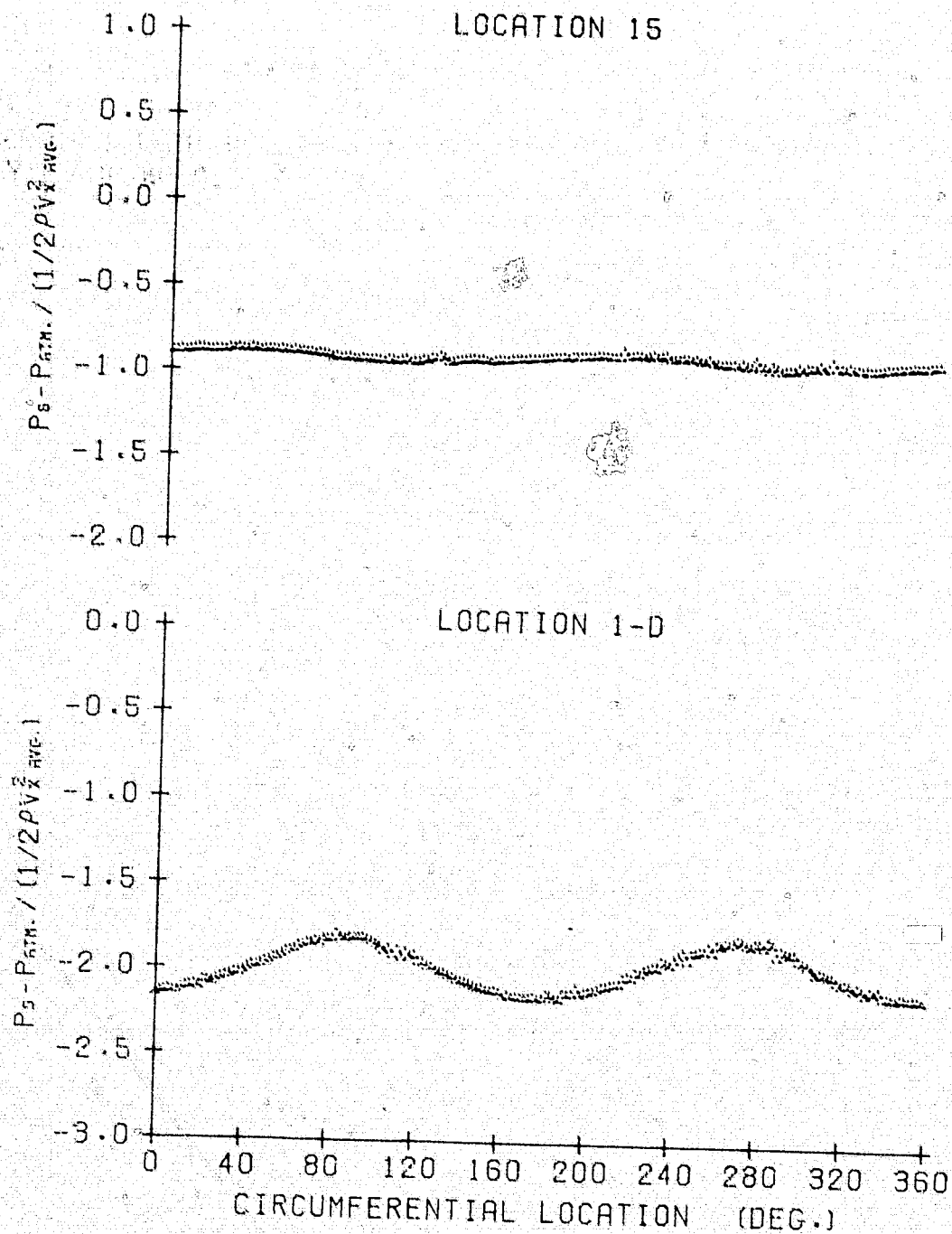


Figure 0.5

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9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1529

AVG. FLOW COEF. = 0.638
AVG. P-RISE COEF. = 1.188
AVG. INCIDENCE = 1.18 DEG.

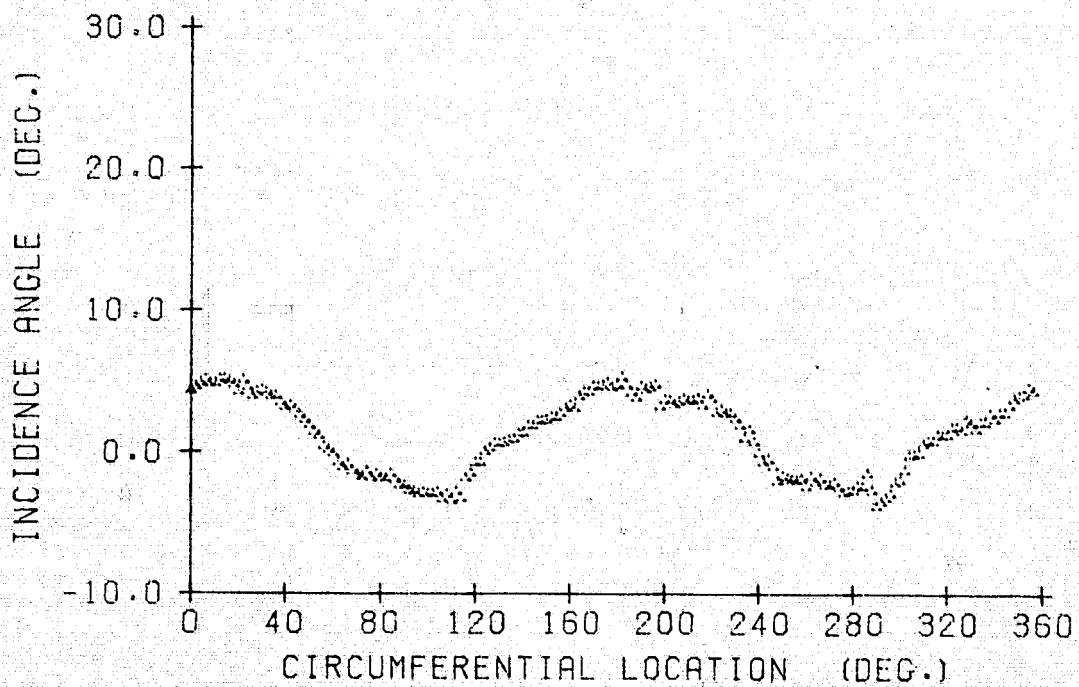


Figure C.6

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1704

AVG. FLOW COEF. = 0.564
AVG. P-RISE COEF. = 1.960
AVG. INCIDENCE = 4.28 DEG.

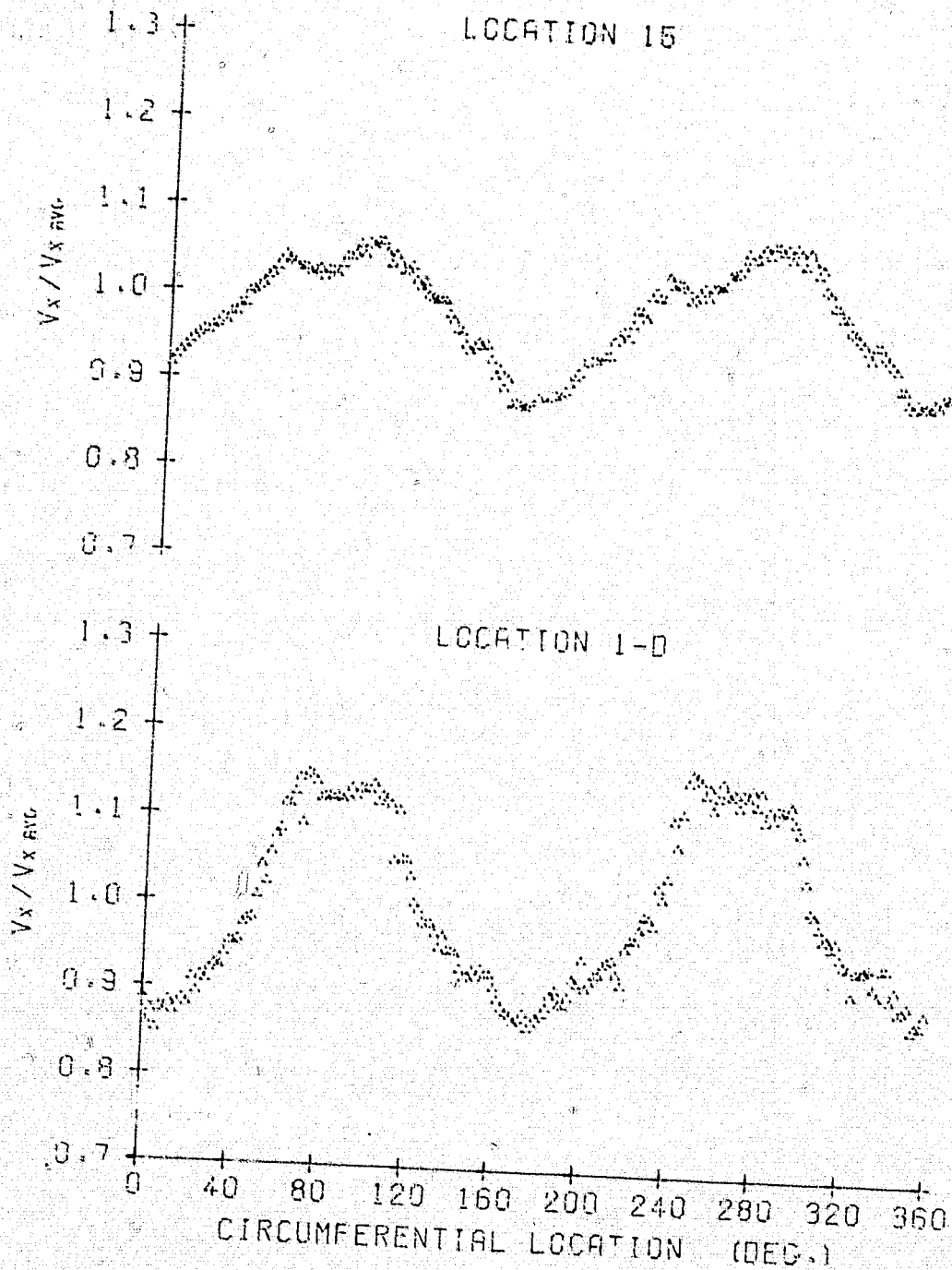


Figure C.7

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1704

AVG. FLOW COEF. = 0.564
AVG. P-RISE COEF. = 1.960
AVG. INCIDENCE = 4.28 DEG.

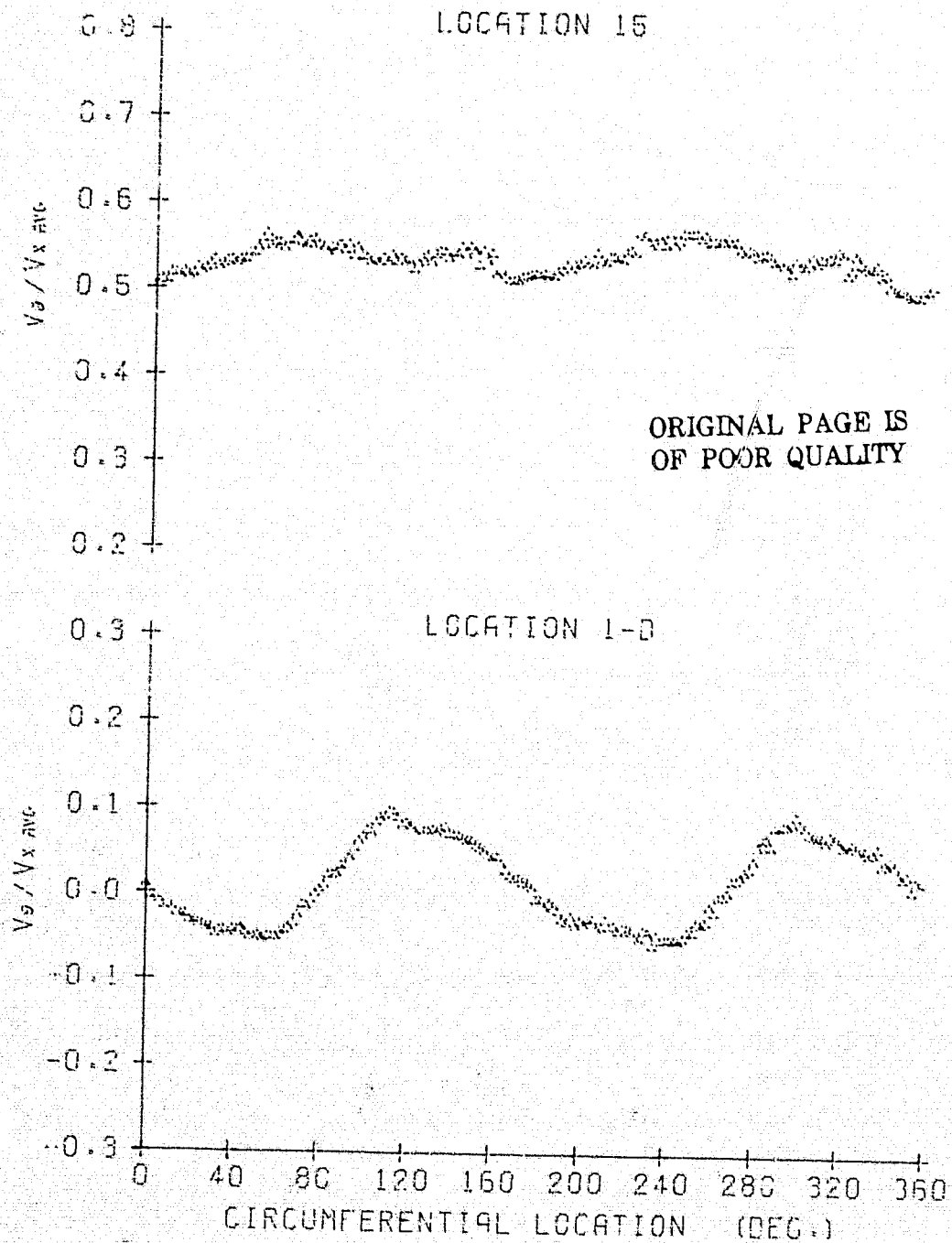


Figure C.8

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1704

AVG. FLOW COEF. = 0.564
AVG. P-RISE COEF. = 1.960
AVG. INCIDENCE = 4.28 DEG.

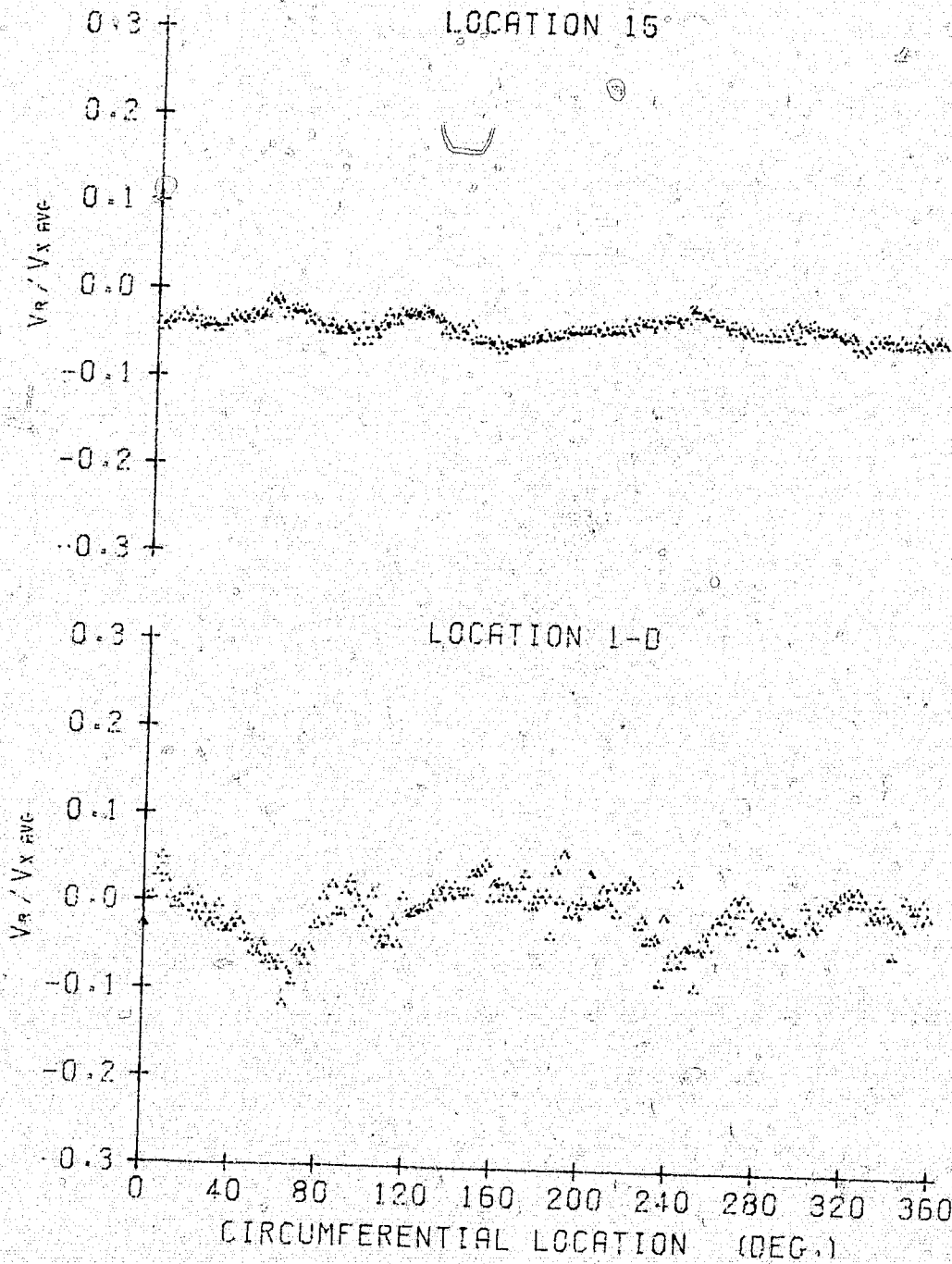


Figure C.9

10 October 1978

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3 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1704

AVG. FLOW COEF. = 0.564
AVG. P-RISE COEF. = 1.960
AVG. INCIDENCE = 4.28 DEG.

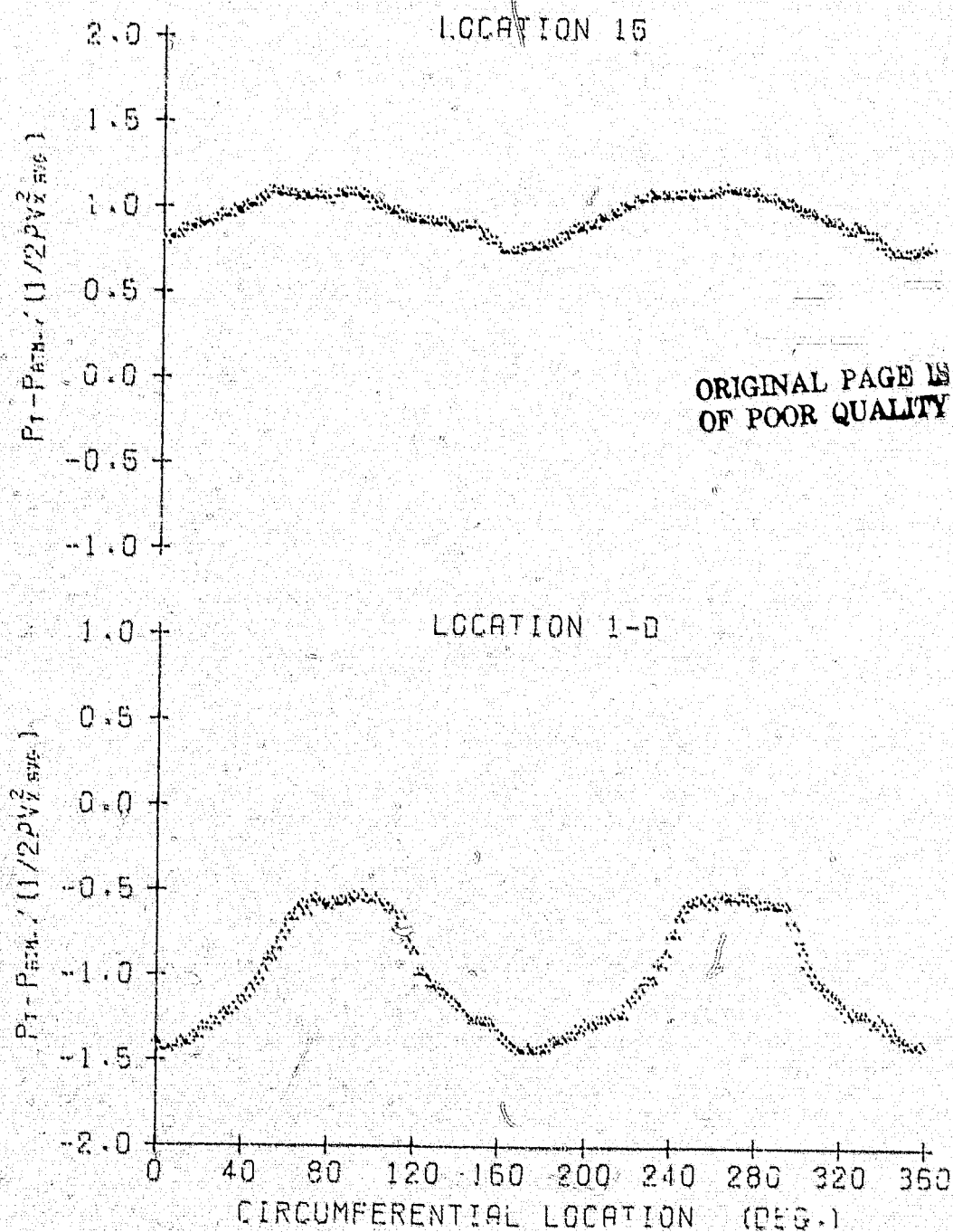


Figure C.10

10 October 1978

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4 BLADES
 60 DEG STAGGER ANGLE
 2 CYCLE DISTORTION
 RPM = 1704

AVG. FLOW COEFF. = 0.564
 AVG. P-RISE COEFF. = 1.860
 AVG. INCIDENCE = 4.28 DEG.

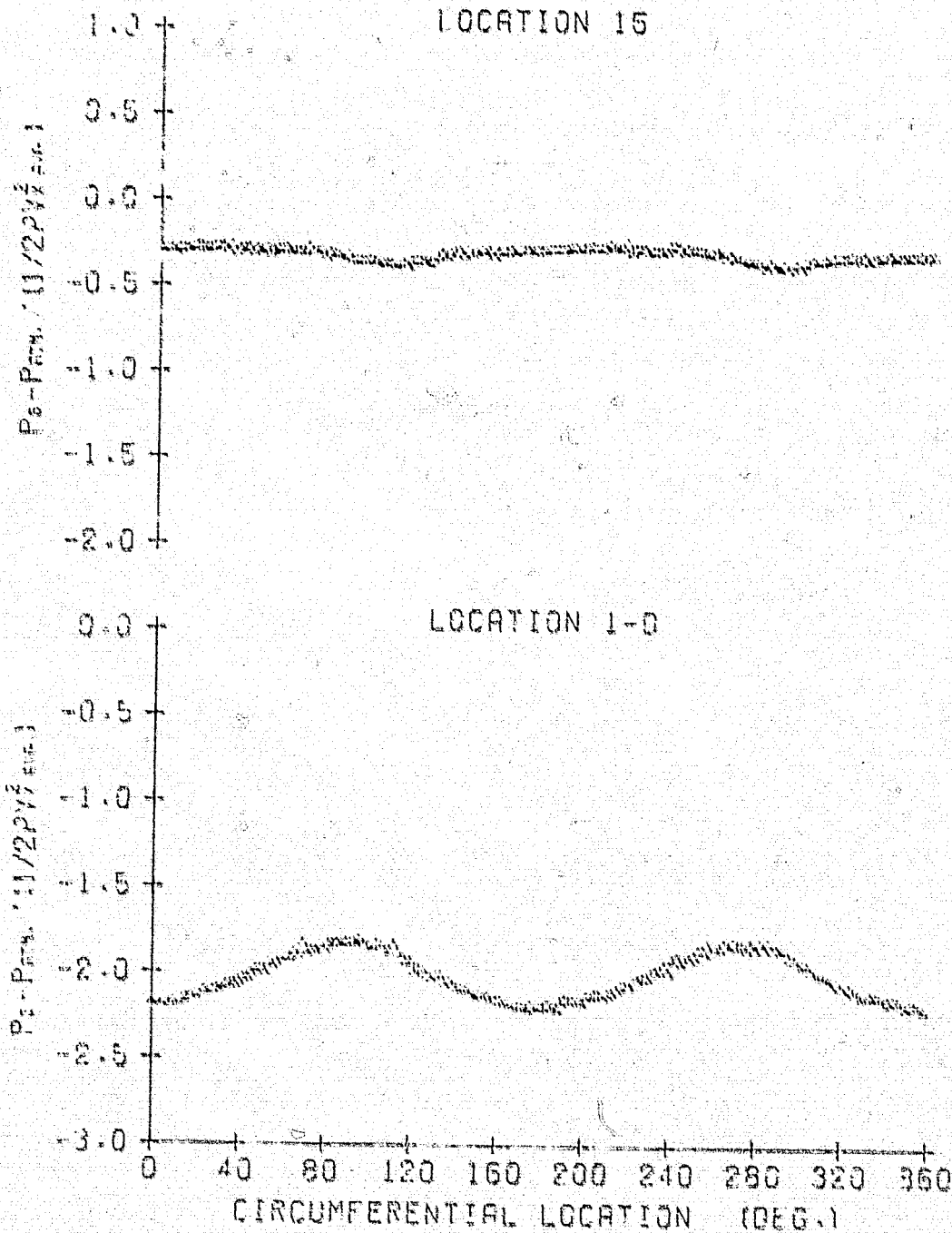


Figure C.11

10 October 1978
LCB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1704

AVG. FLOW COEF. = 0.564
AVG. P-RISE COEF. = 1.960
AVG. INCIDENCE = 4.28 DEG.

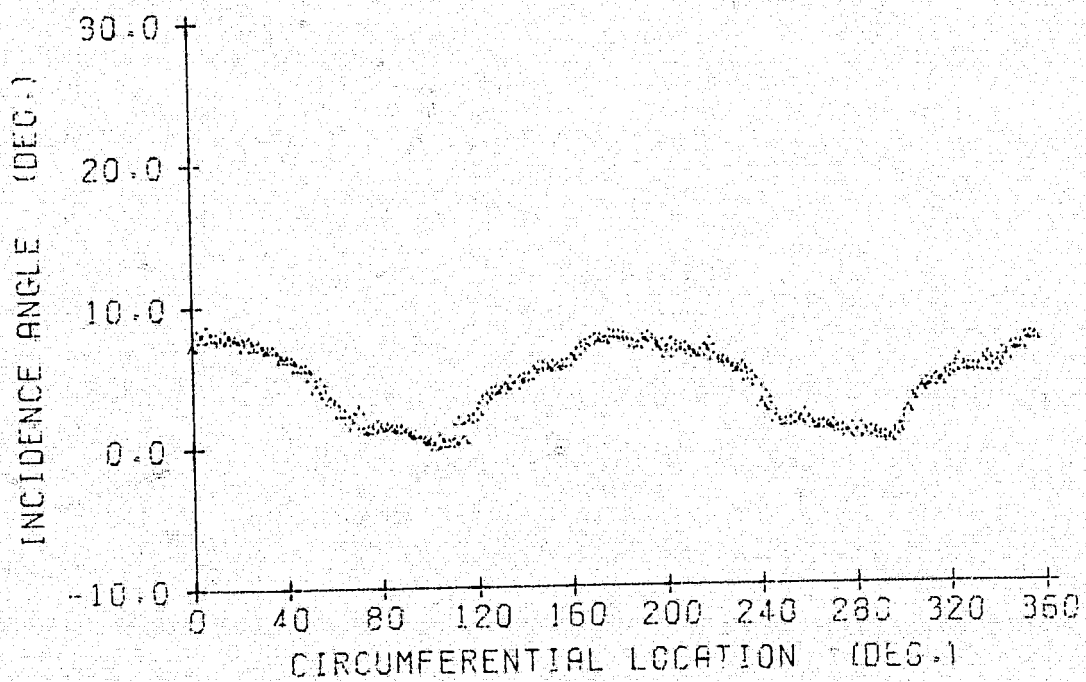


Figure C.12

10 October 1978
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8 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1842

AVG. FLOW COEF. = 0.517
AVG. P-RISE COEF. = 2.623
AVG. INCIDENCE = 6.40 DEG.

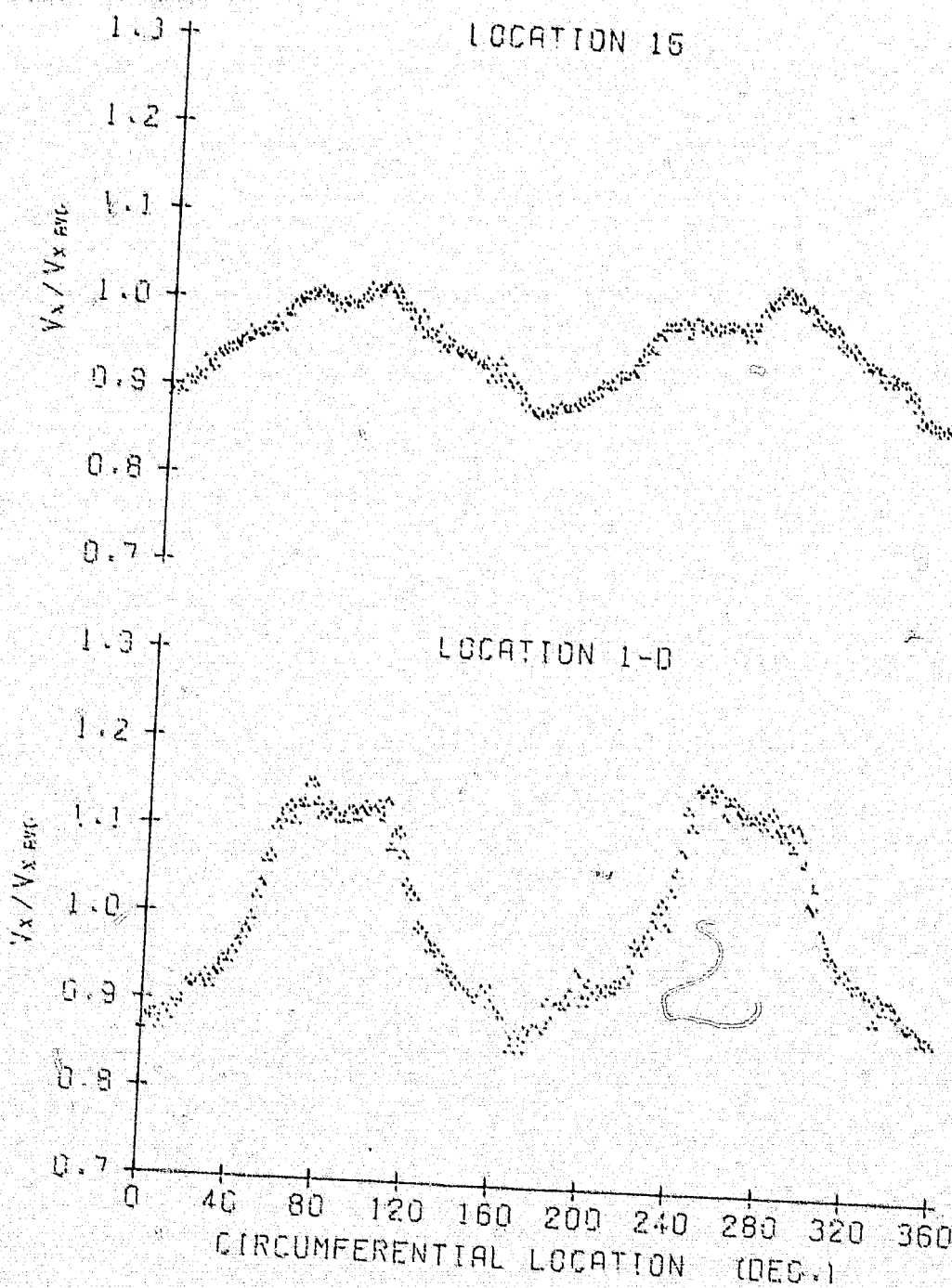


Figure C.13

10 October 1978
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0 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1842

AVG. FLOW COEF. = 0.517
AVG. P-RISE COEF. = 2.523
AVG. INCIDENCE = 5.40 DEG.

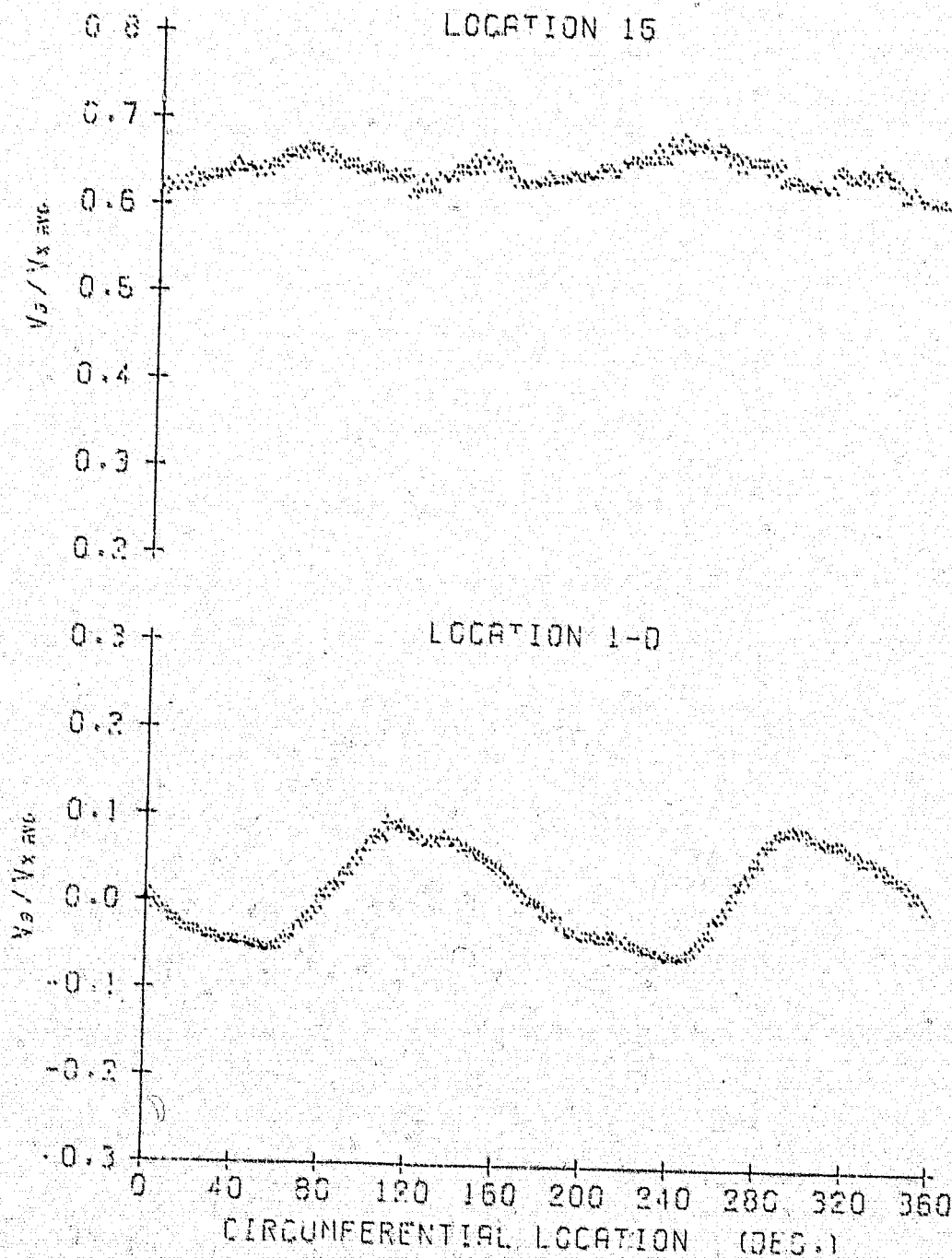


Figure C.14

10 October 1978
LCB:jep

3 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1842

AVG. FLOW COEF. = 0.517
AVG. P-RISE COEF. = 2.623
AVG. INCIDENCE = 6.40 DEG.

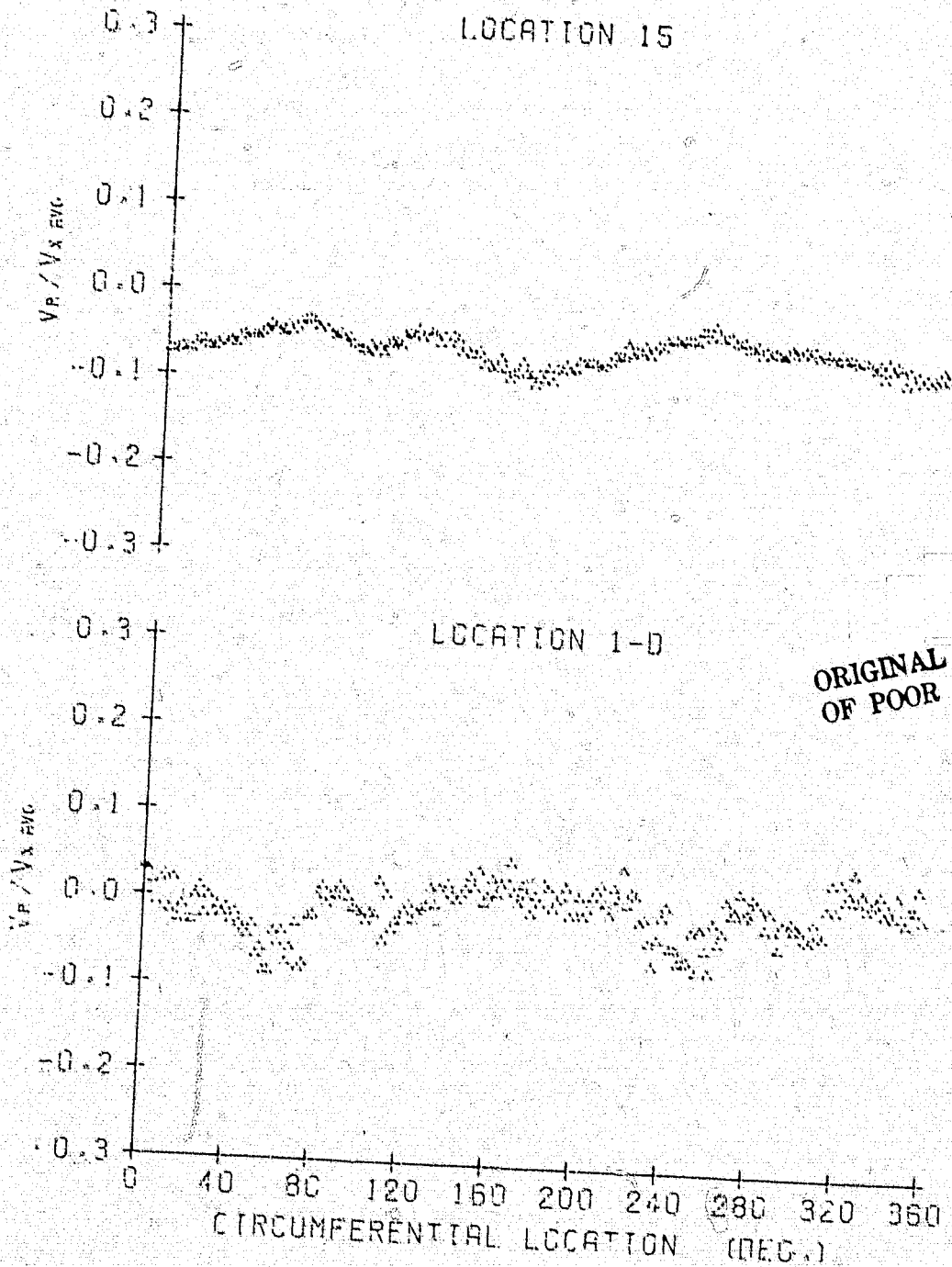


Figure C.15

10 October 1978
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9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1842

AVG. FLOW COEFF. = 0.517
AVG. P-RISE COEFF. = 2.623
AVG. INCIDENCE = 6.40 DEG.

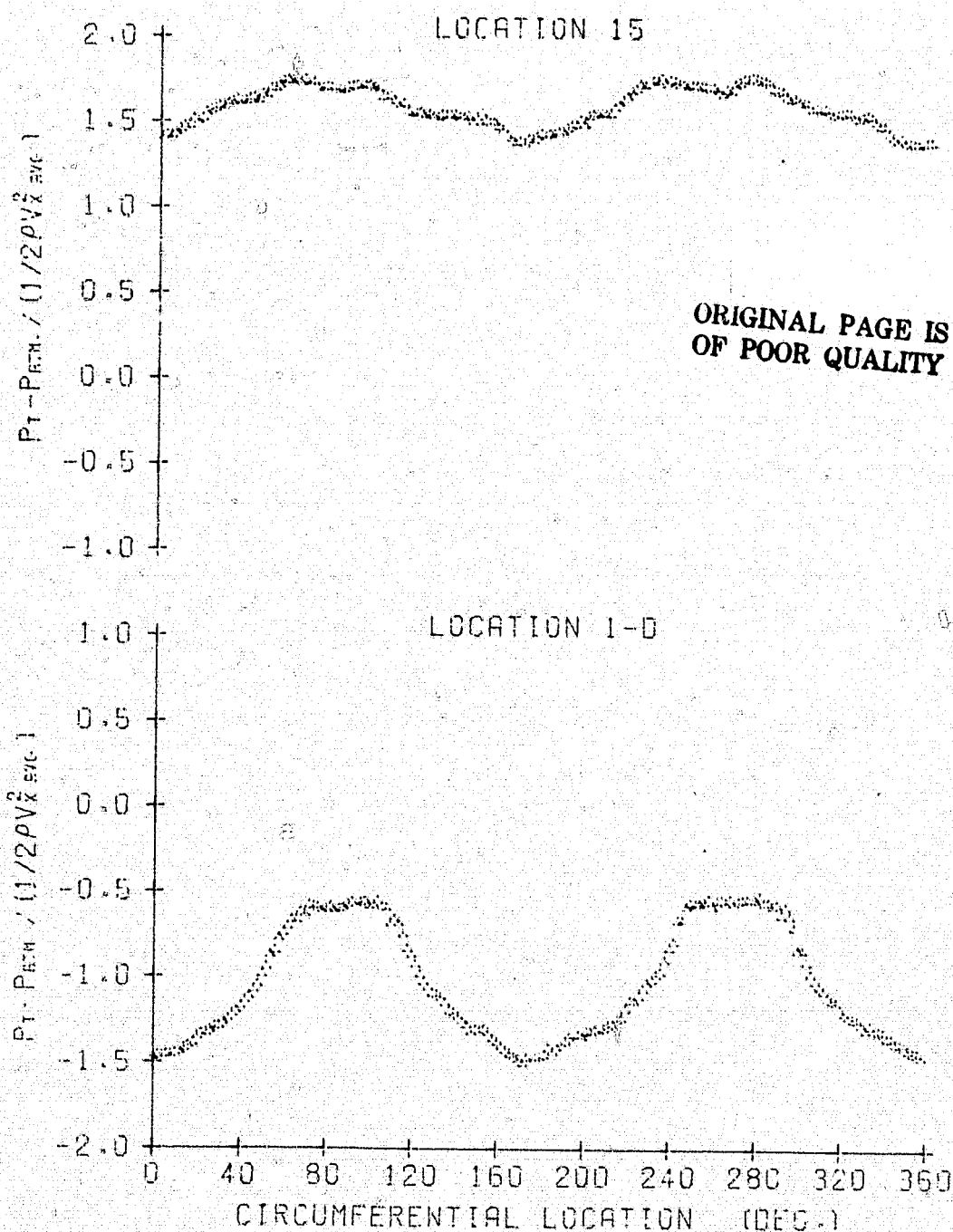


Figure C.16

10 October 1978
LCB:jep

9 BLADES
50 DEG STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1842

AVG. FLOW COEF. = 0.517
AVG. P-RISE COEF. = 2.623
AVG. INCIDENCE = 6.40 DEG.

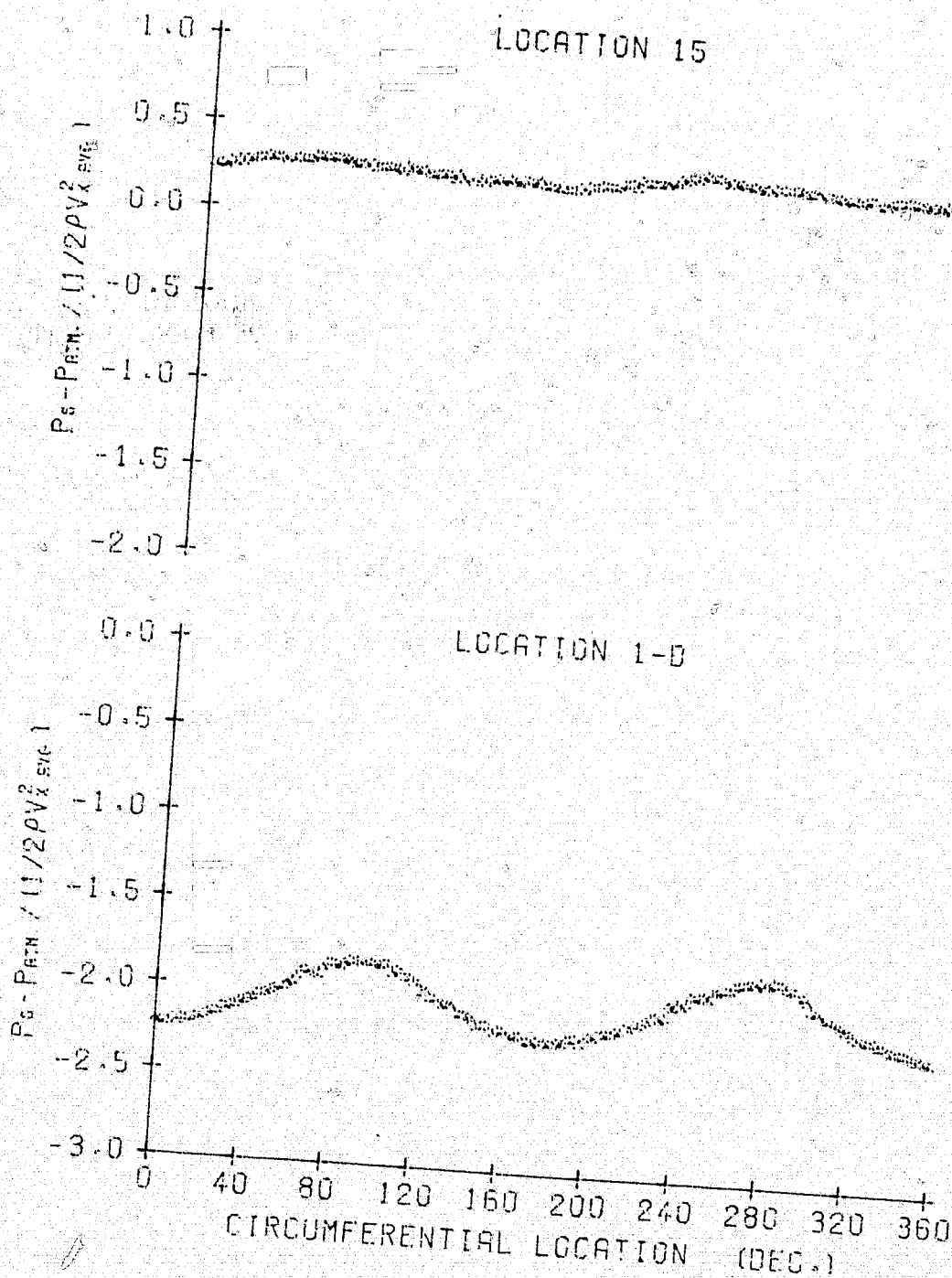


Figure C.17

10 October 1978
LCB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1842

AVG. FLOW COEF. = 0.517
AVG. P-RISE COEF. = 2.623
AVG. INCIDENCE = 6.40 DEG.

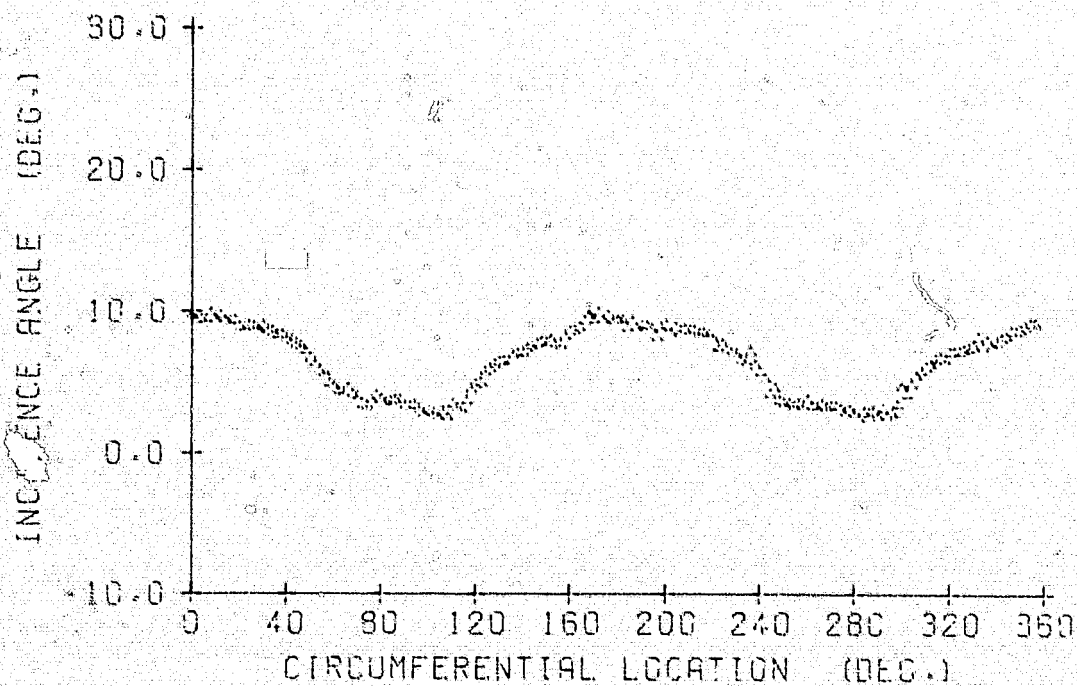


Figure C.18

10 October 1978
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9 BLADES
50 DEG STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1520

AVG. FLOW COEF. = 0.632
AVG. P-RISE COEF. = 1.210
AVG. INCIDENCE = 1.55 DEG.

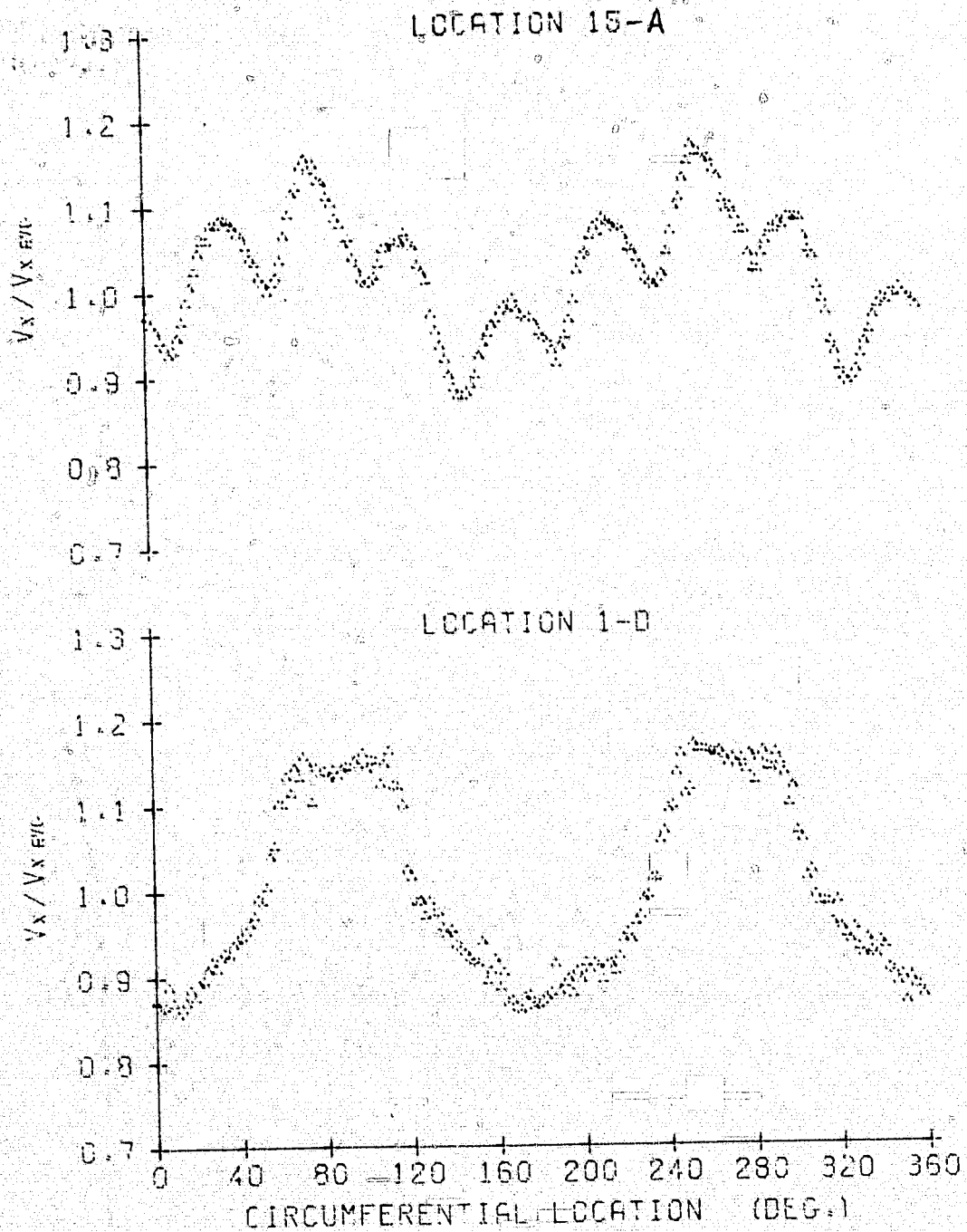


Figure C.19

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1529

AVG. FLOW COEF. = 0.632
AVG. P-RISE COEF. = 1.210
AVG. INCIDENCE = 1.56 DEG.

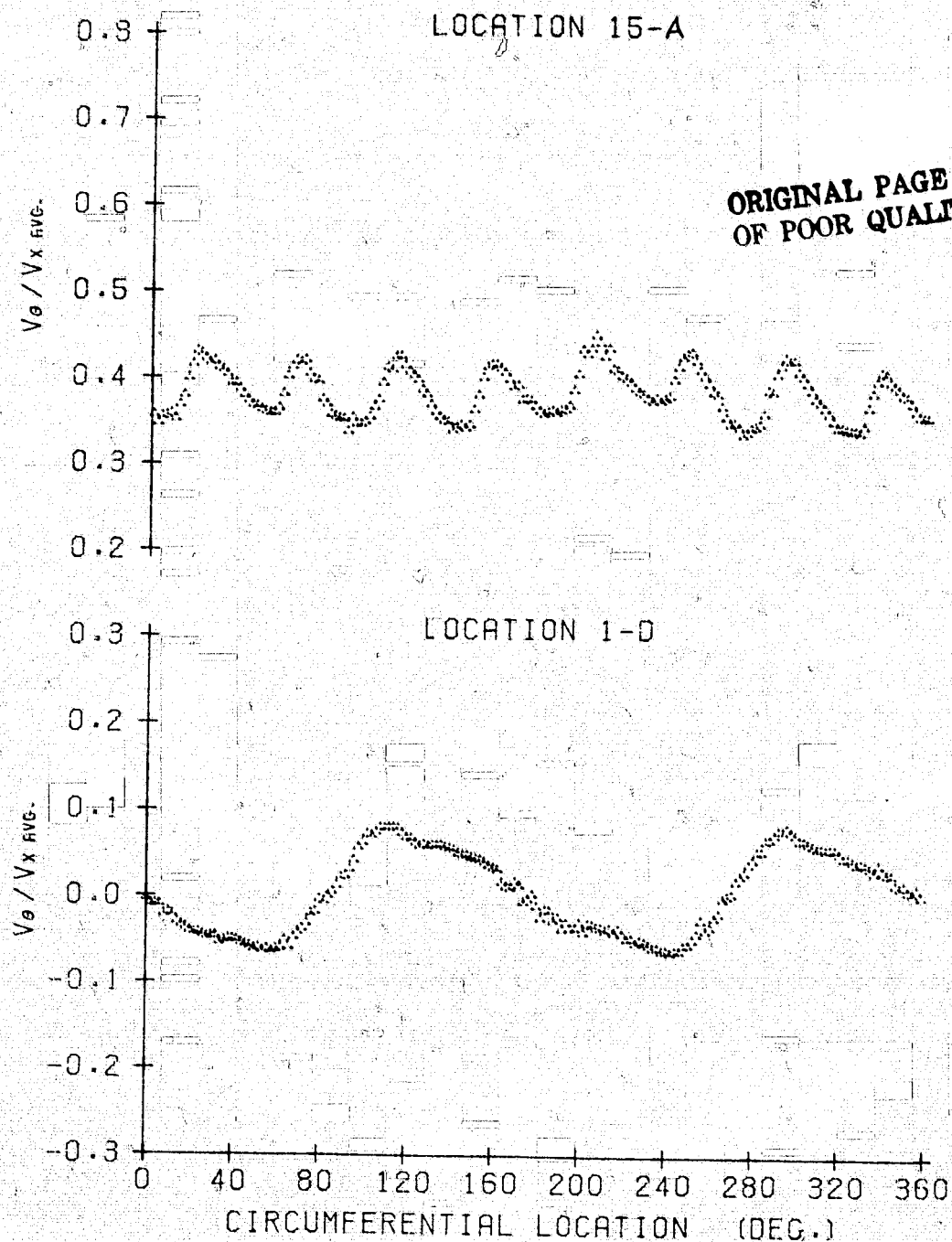


Figure C.20

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1529

AVG. FLOW COEF. = 0.632
AVG. P-RISE COEF. = 1.210
AVG. INCIDENCE = 1.56 DEG.

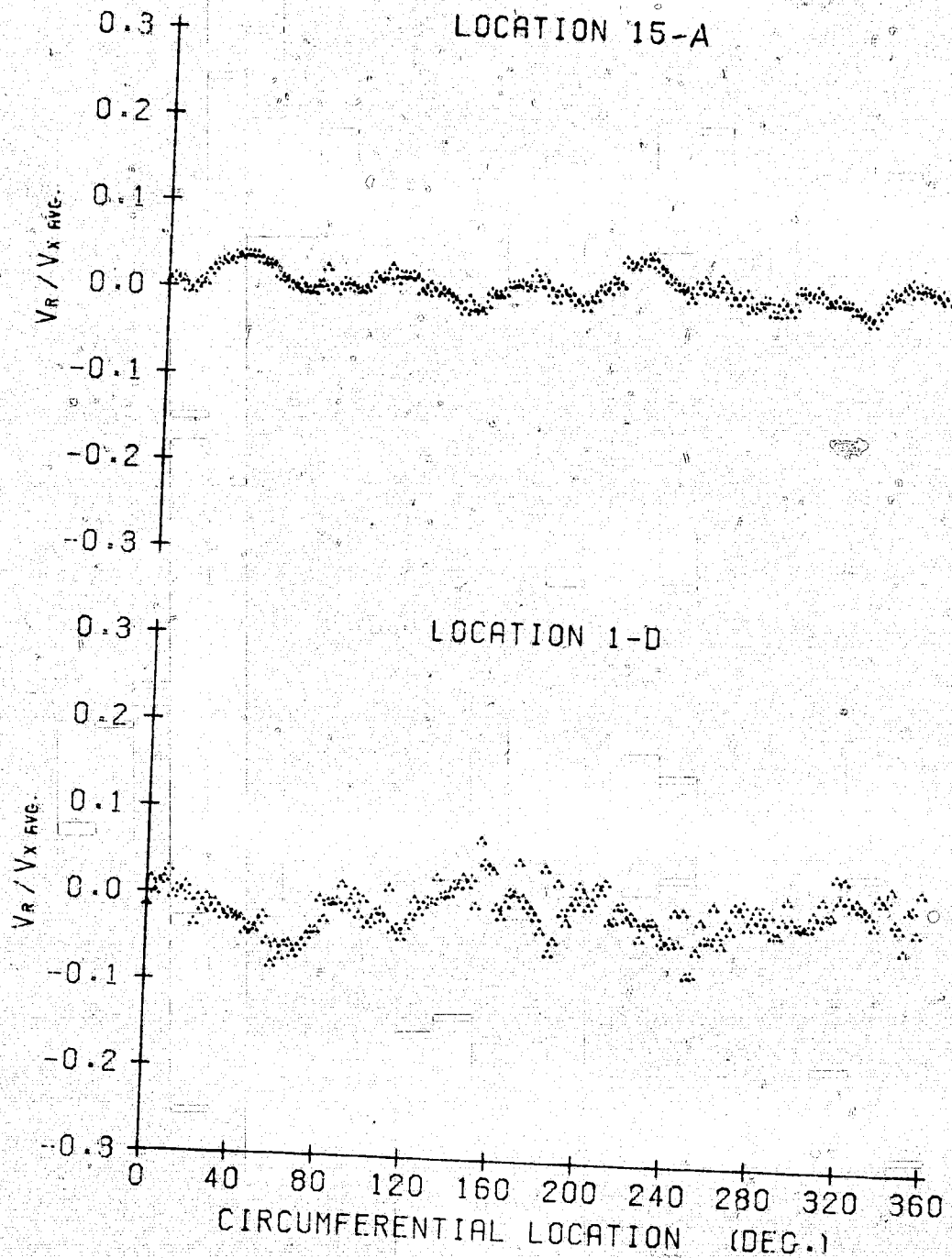


Figure C.21

10 October 1978

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9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1529

AVG. FLOW COEF. = 0.632
AVG. P-RISE COEF. = 1.210
AVG. INCIDENCE = 1.56 DEG.

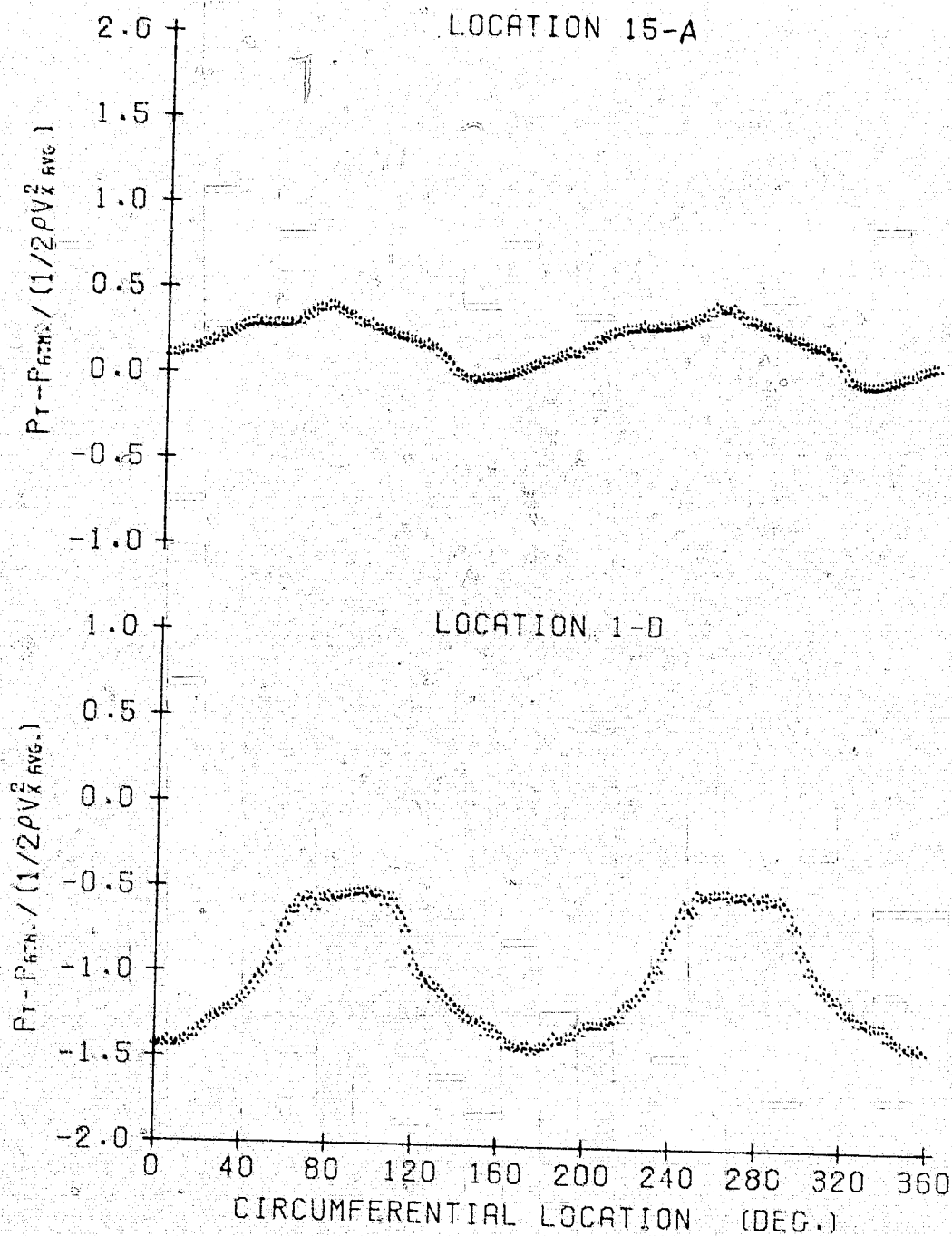


Figure C.22

C-2

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9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1529

AVG. FLOW COEF. = 0.632
AVG. P-RISE COEF. = 1.210
AVG. INCIDENCE = 1.56 DEG.

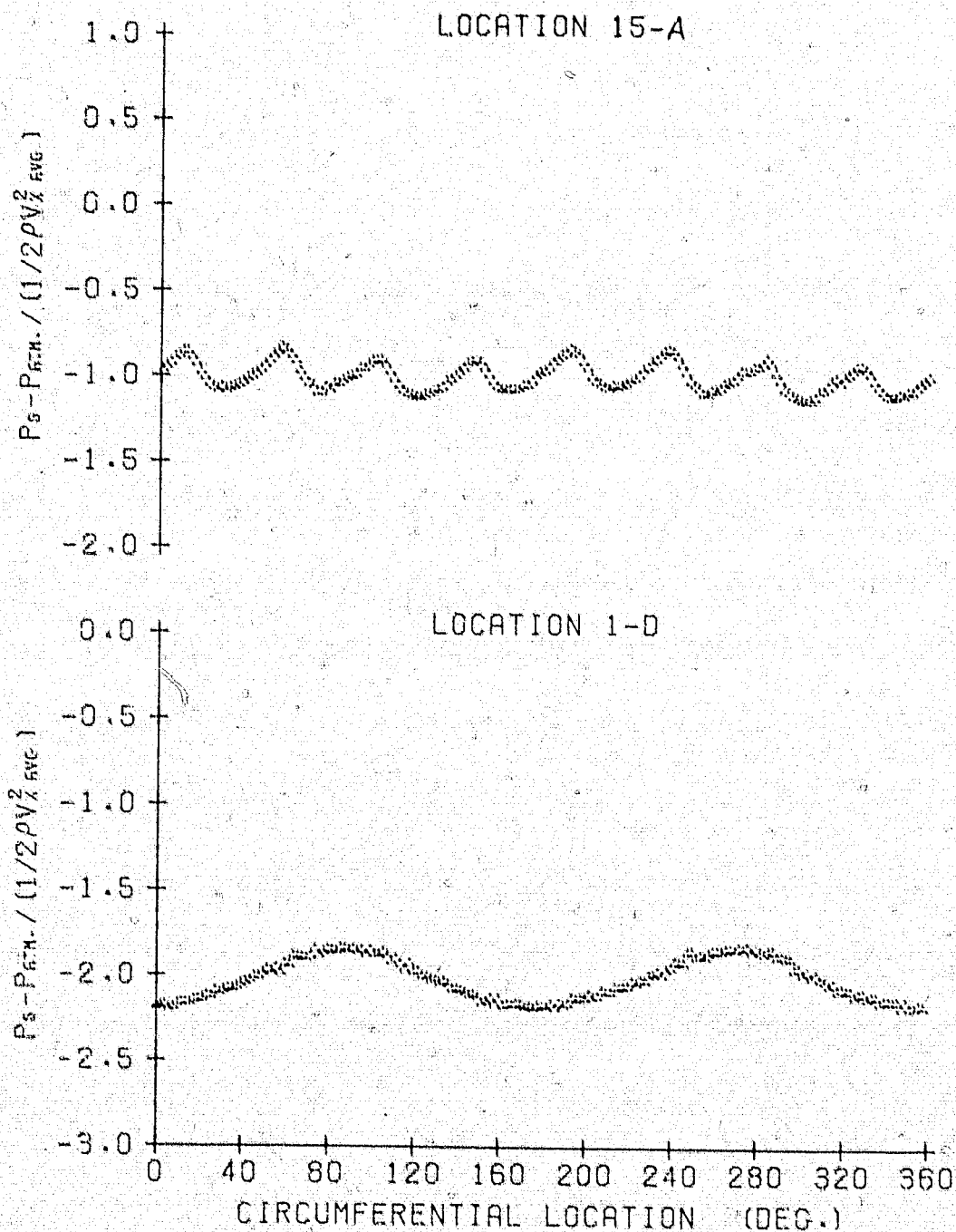


Figure C.23

10 October 1978

LCB:jep

9 BLADES
56 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1529

AVG. FLOW COEF. = 0.632
AVG. P-RISE COEF. = 1.210
AVG. INCIDENCE = 1.56 DEG.

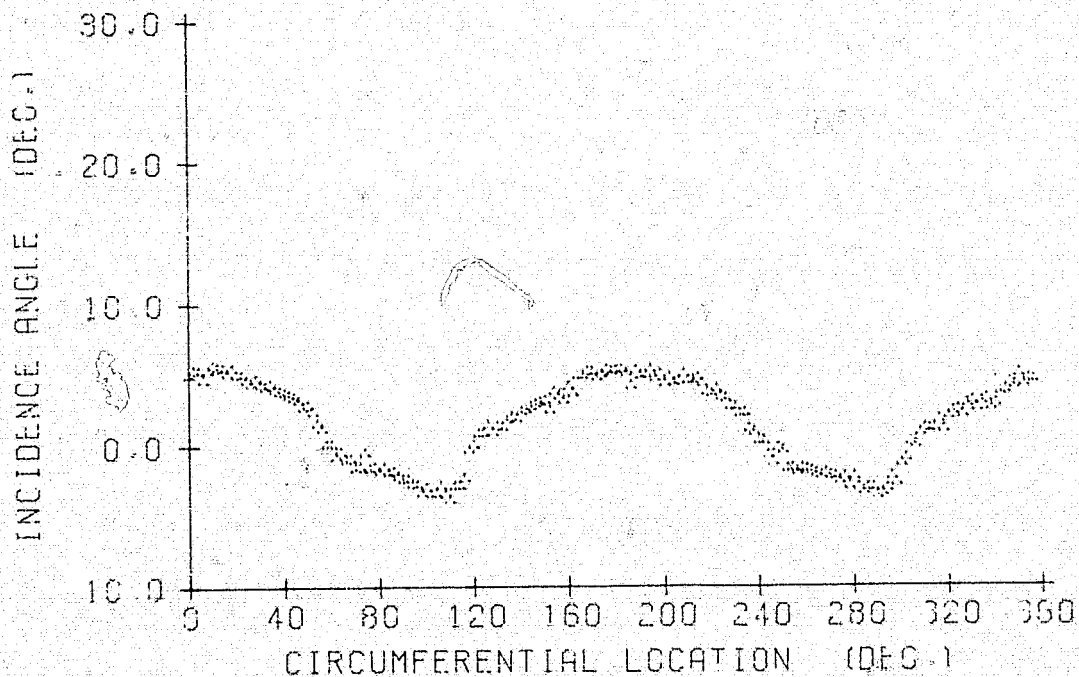


Figure C.24

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STAGGER ANGLE
DISTORTION
RPM 1304

AVG. FLOW COEFF. = 0.555
AVG. P-RISE COEFF. = 1.910
AVG. INCIDENCE = 4.37 DEG.

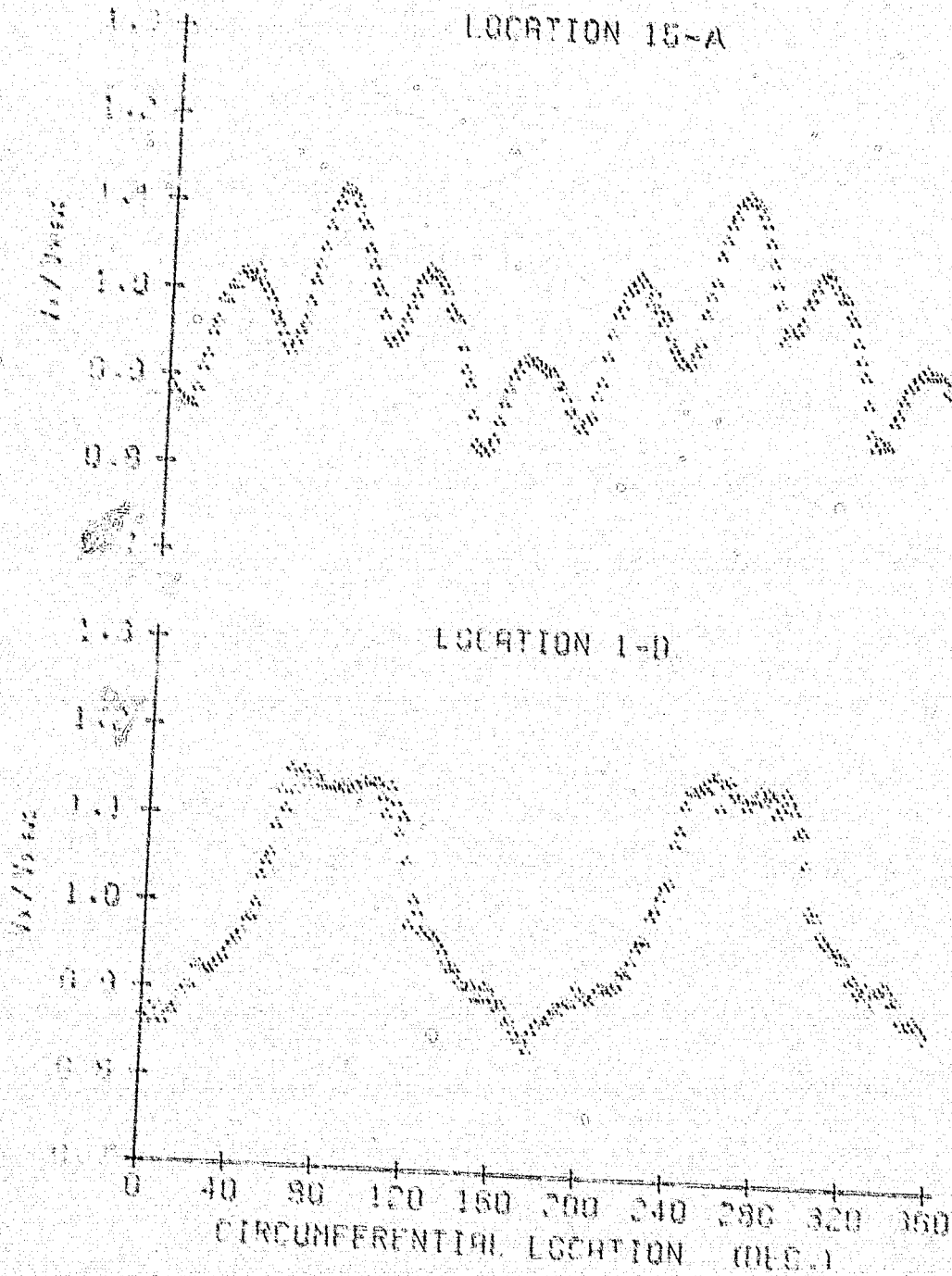


Figure C.25

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1704

AVG. FLOW COEF. = 0.565
AVG. P-RISE COEF. = 1.910
AVG. INCIDENCE = 4.37 DEG.

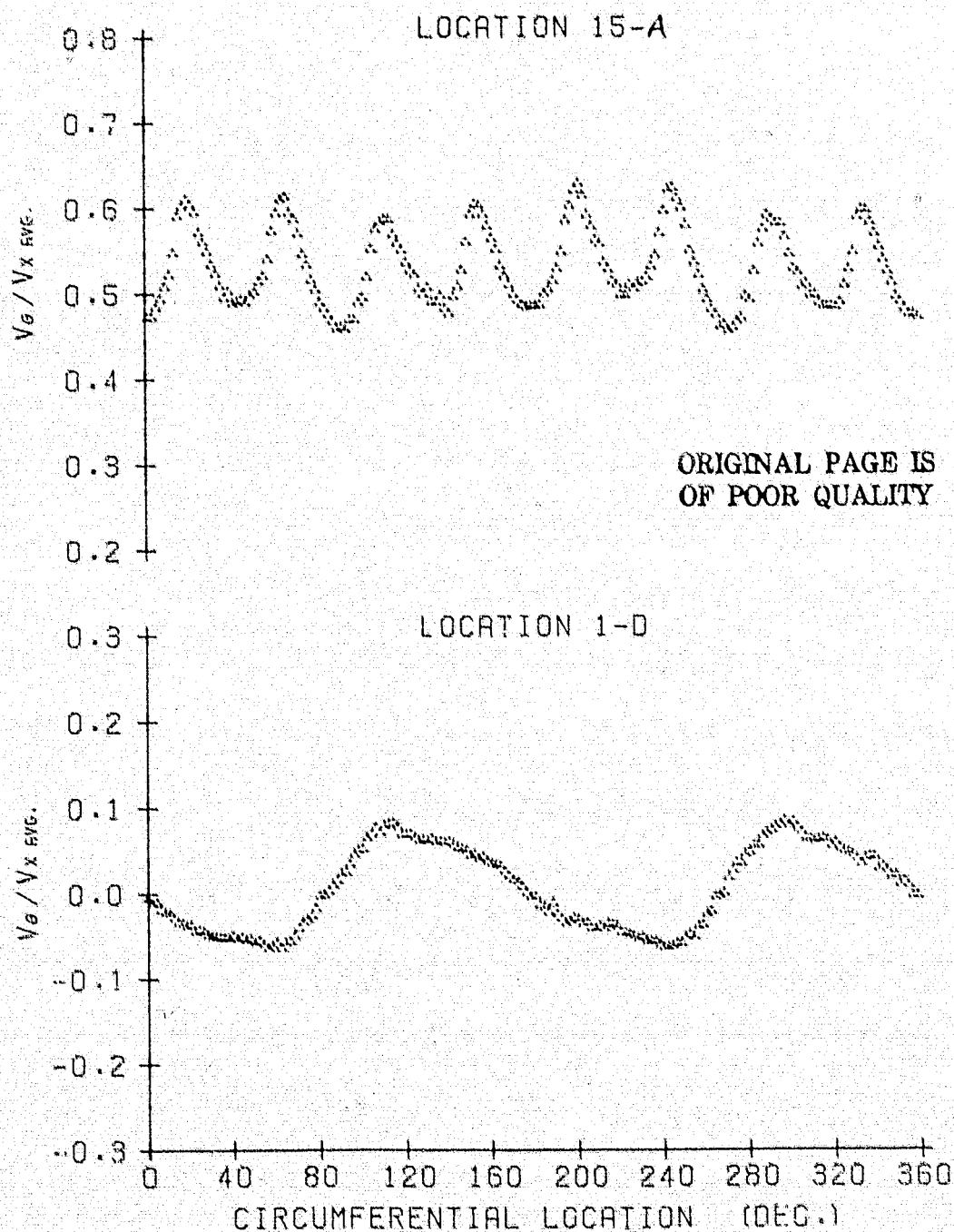


Figure C.26

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1704

AVG. FLOW COEF. = 0.565
AVG. P-RISE COEF. = 1.910
AVG. INCIDENCE = 4.37 DEG.

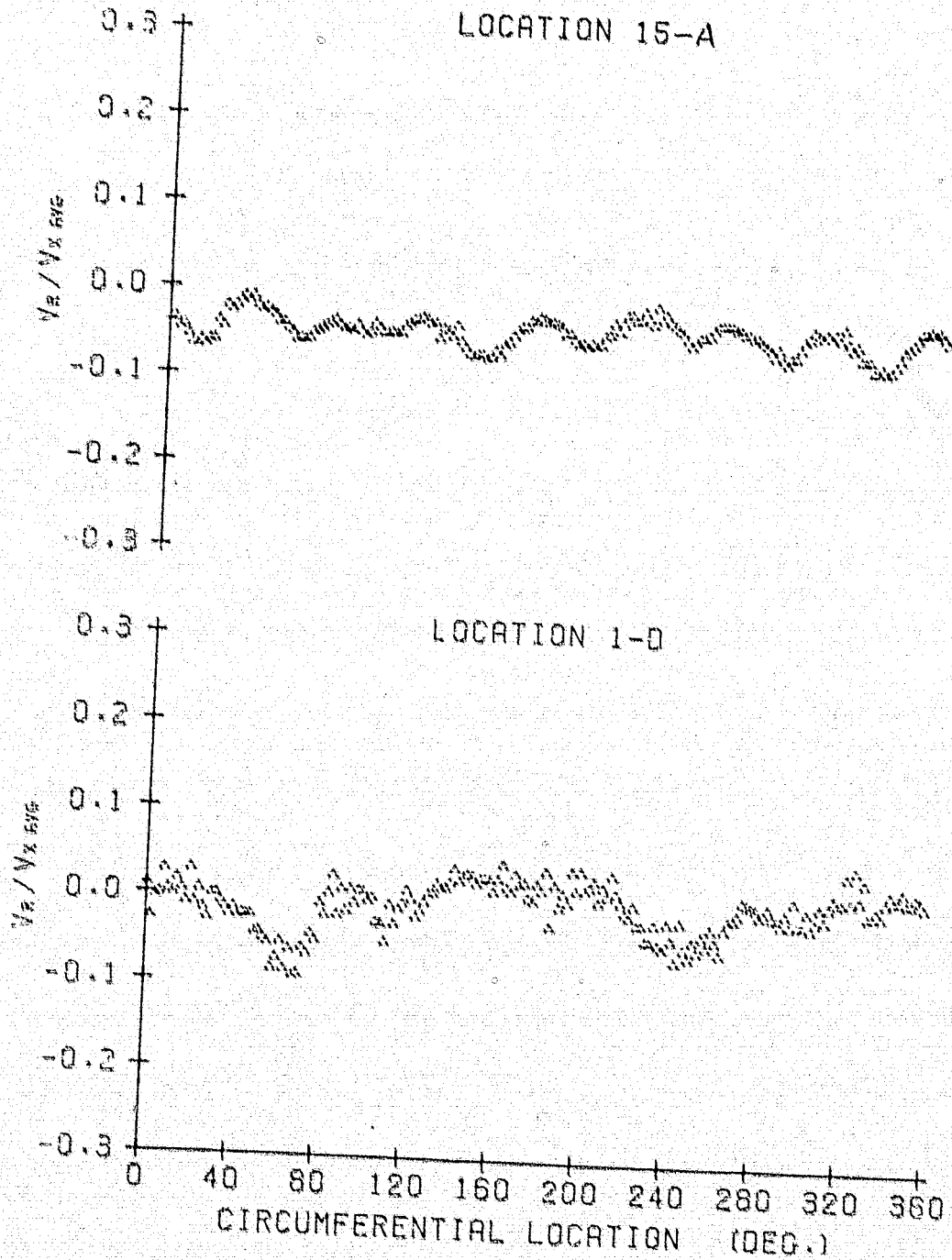


Figure C.27

10 October 1978
LGB:jep

9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1704

AVG. FLOW COEF. = 0.555
AVG. P-RISE COEF. = 1.010
AVG. INCIDENCE = 4.37 DEG

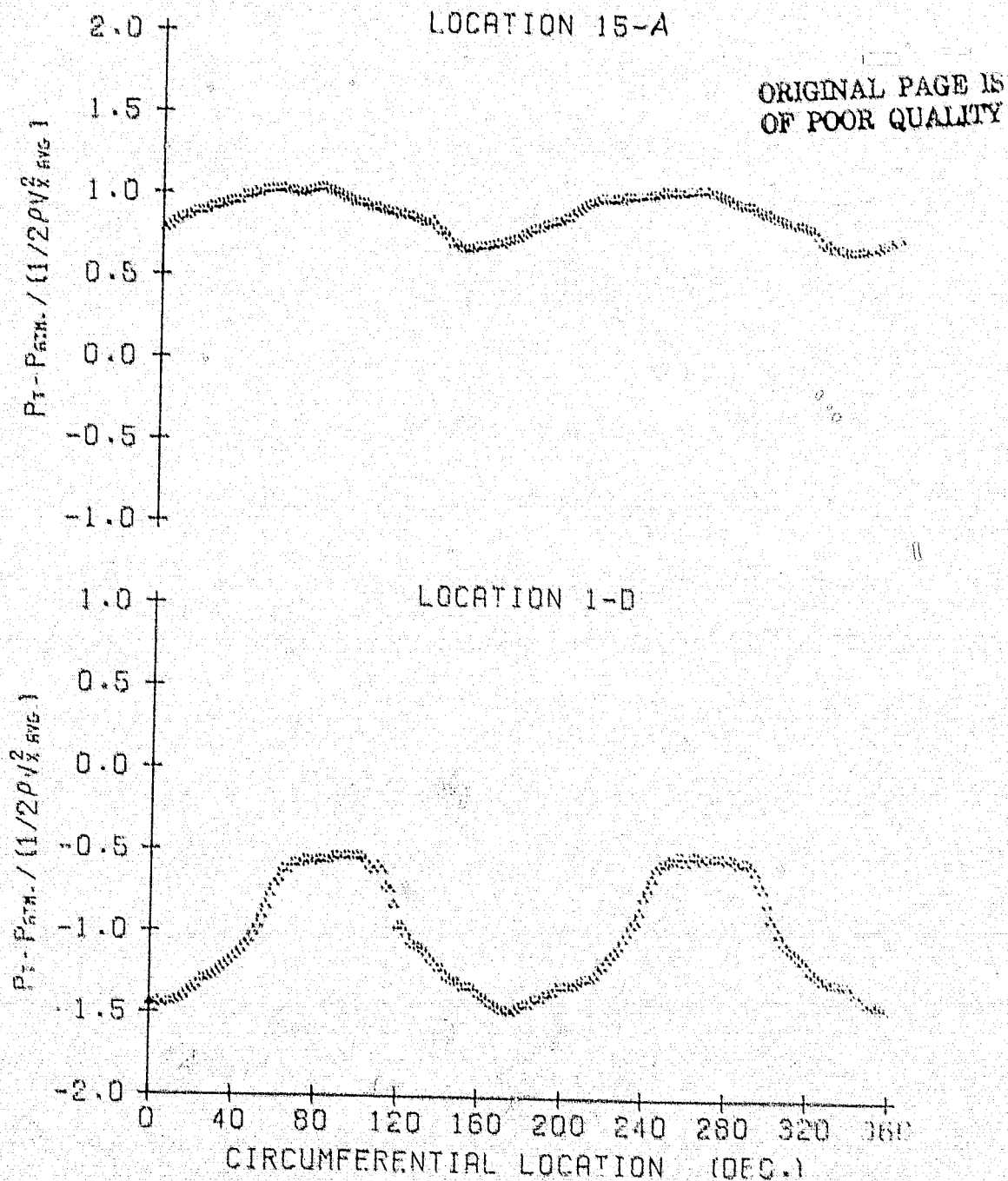


Figure C.28

10 October 1978
LCB:jep

3 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1704

AVG. FLOW COEF. = 0.565
AVG. P-RISE COEF. = 1.910
AVG. INCIDENCE = 4.37 DEG.

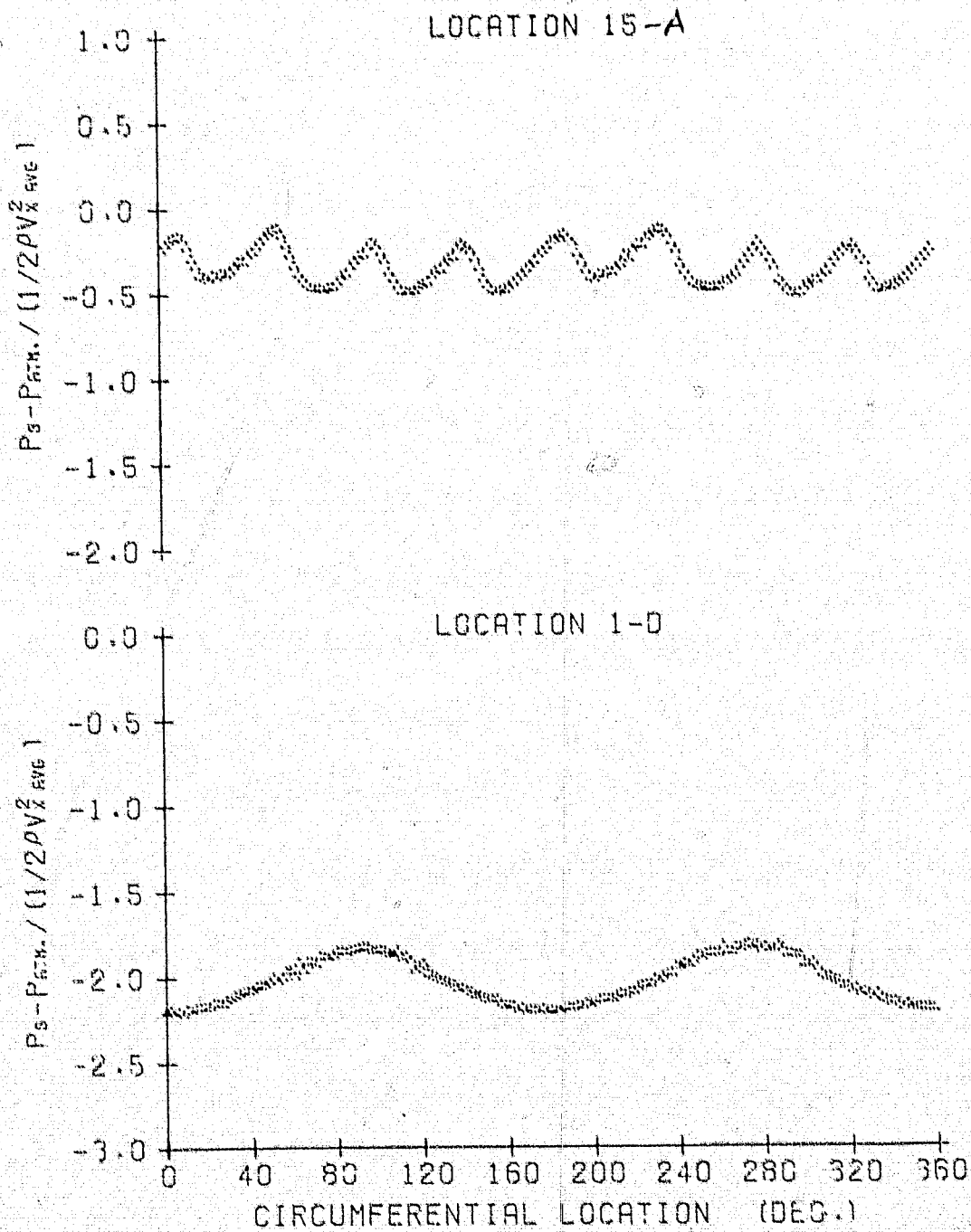


Figure C.29

10 October 1978

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9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1704

AVG. FLOW COEF. = 0.565
AVG. P-RISE COEF. = 1.310
AVG. INCIDENCE = 4.37 DEG

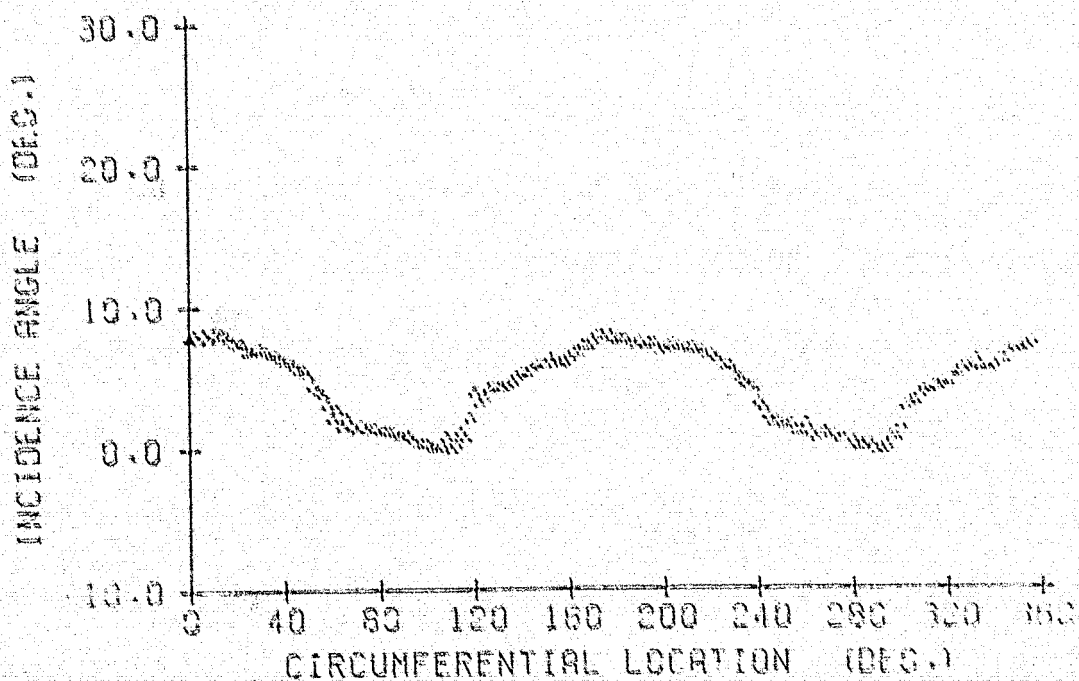


Figure G.30

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1842

AVG. FLOW COEF. = 0.514
AVG. P-RISE COEF. = 2.639
AVG. INCIDENCE = 6.64 DEG.

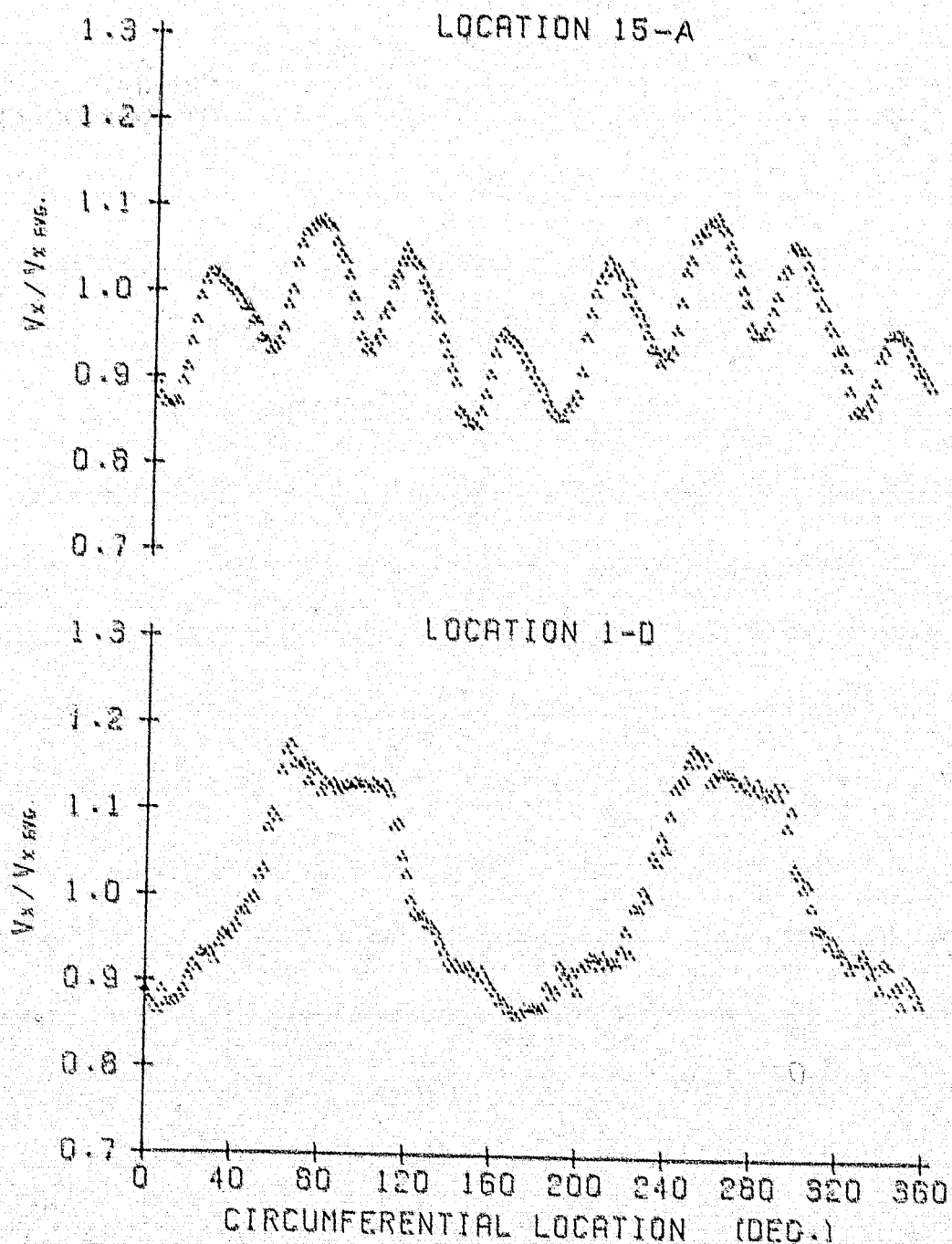


Figure C.31

10 October 1978

LGB:jep

9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1842

AVG. FLOW COEF. = 0.614
AVG. P-RISE COEF. = 2.633
AVG. INCIDENCE = 6.64 DEG.

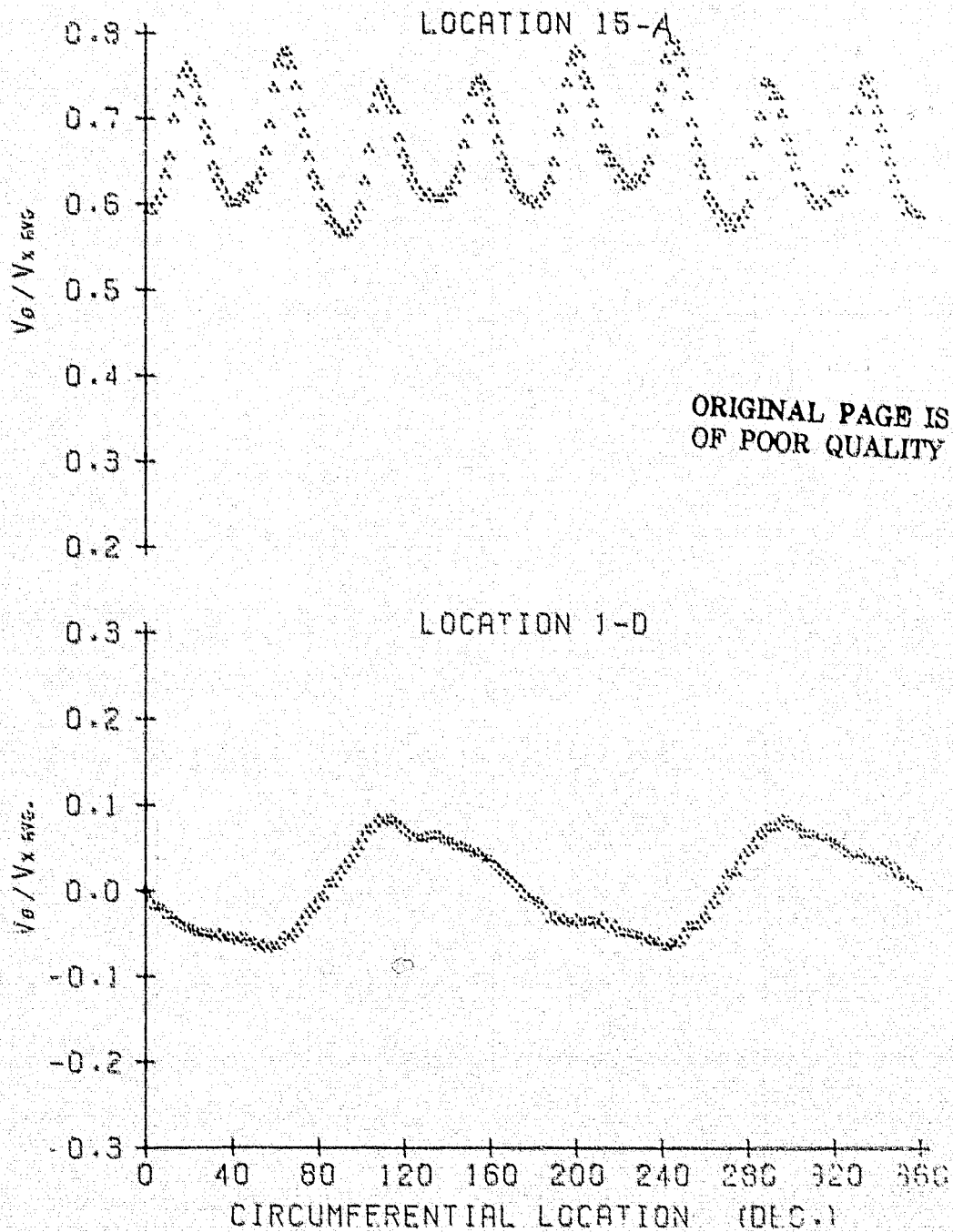


Figure C.32

10 October 1978
LGB:jep

9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1842

AVG. FLOW COEF. = 0.514
AVG. P-RISE COEF. = 2.639
AVG. INCIDENCE = 6.64 DEG.

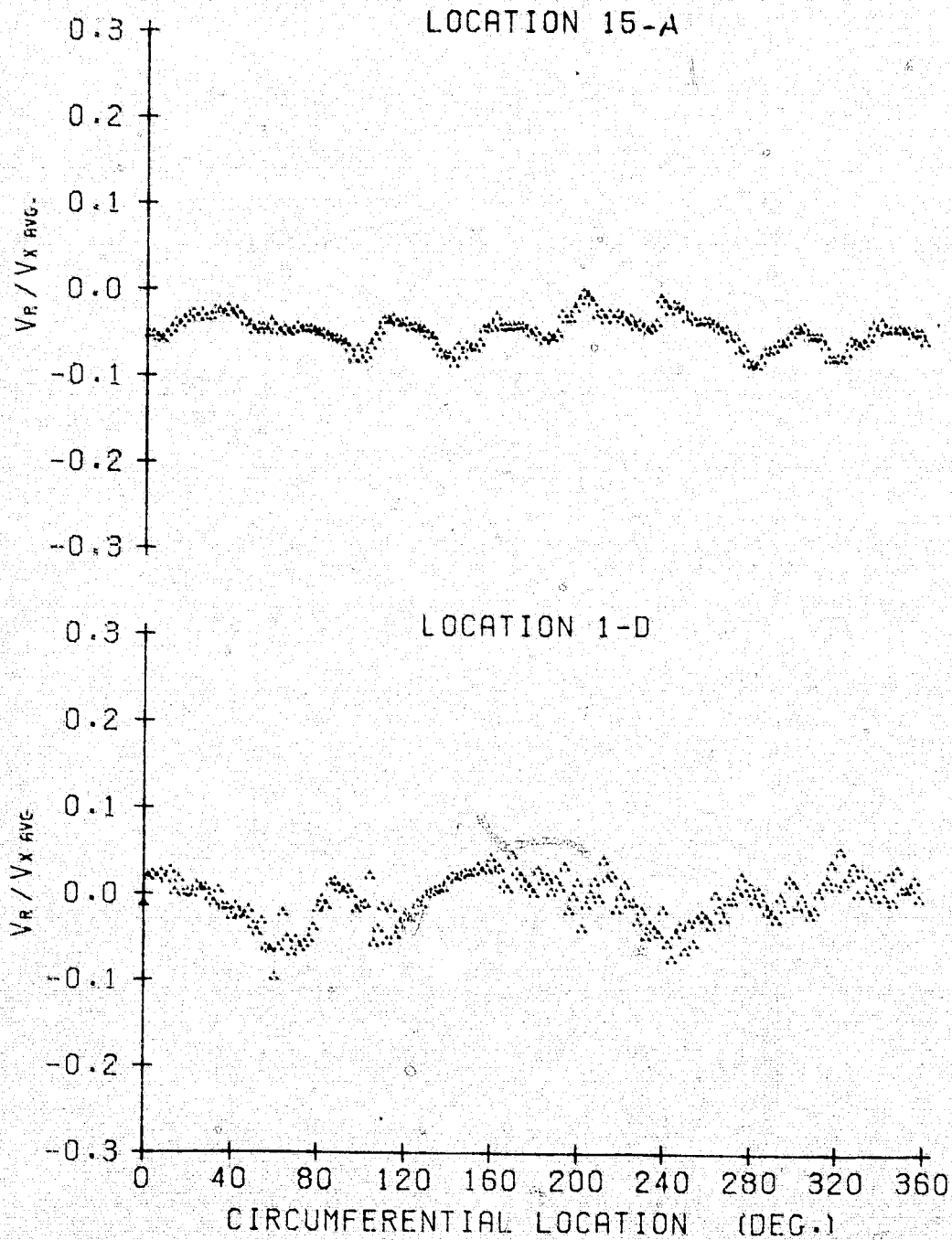


Figure C.33

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1842

AVG. FLOW COEF. = 0.514
AVG. P-RISE COEF. = 2.639
AVG. INCIDENCE = 6.64 DEG.

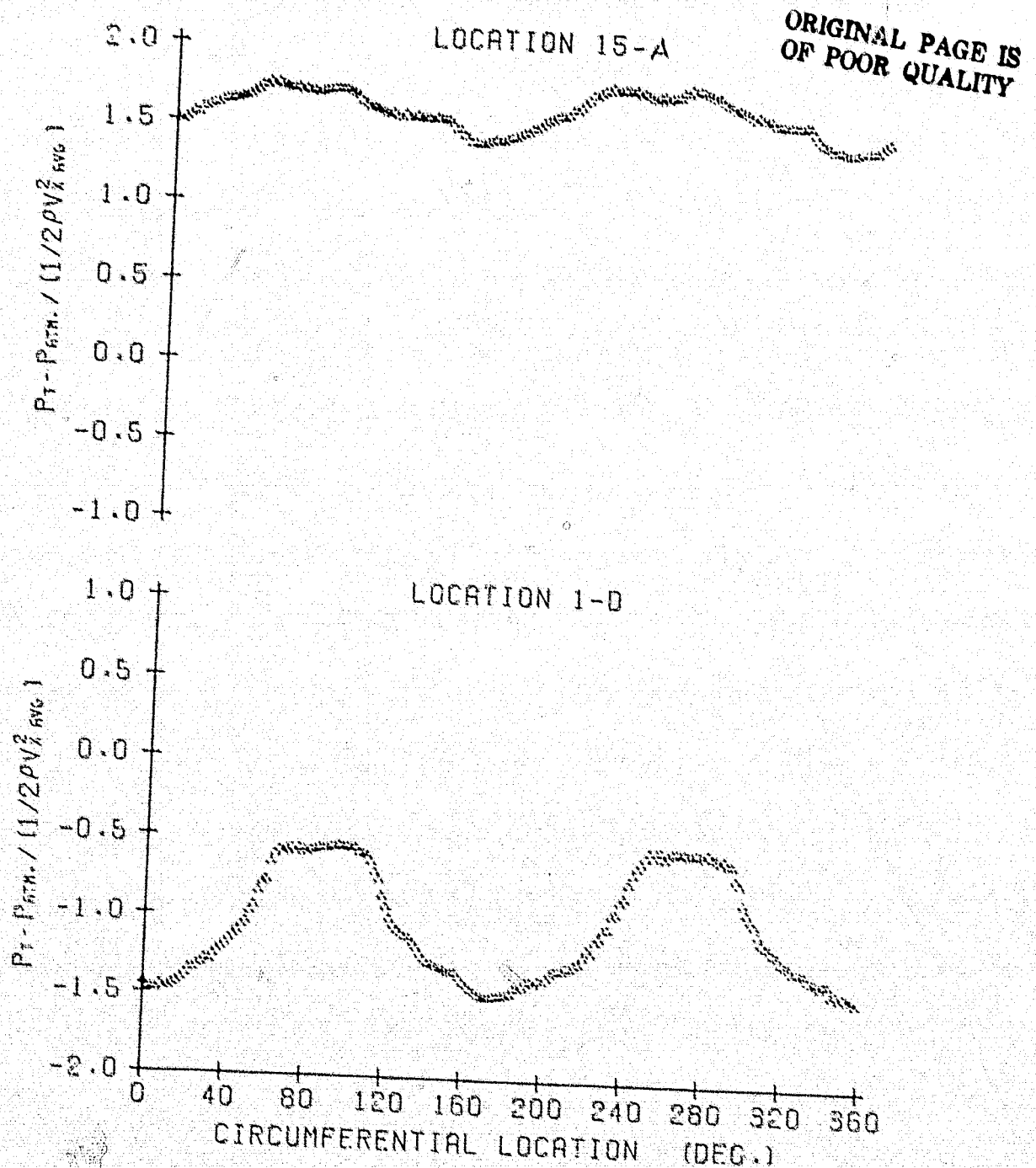


Figure C.34

10 October 1978
LCB:jep

8 SLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1842

AVG. FLOW COEF. = 0.514
AVG. P-RISE COEF. = 2.639
AVG. INCIDENCE = 6.64 DEG.

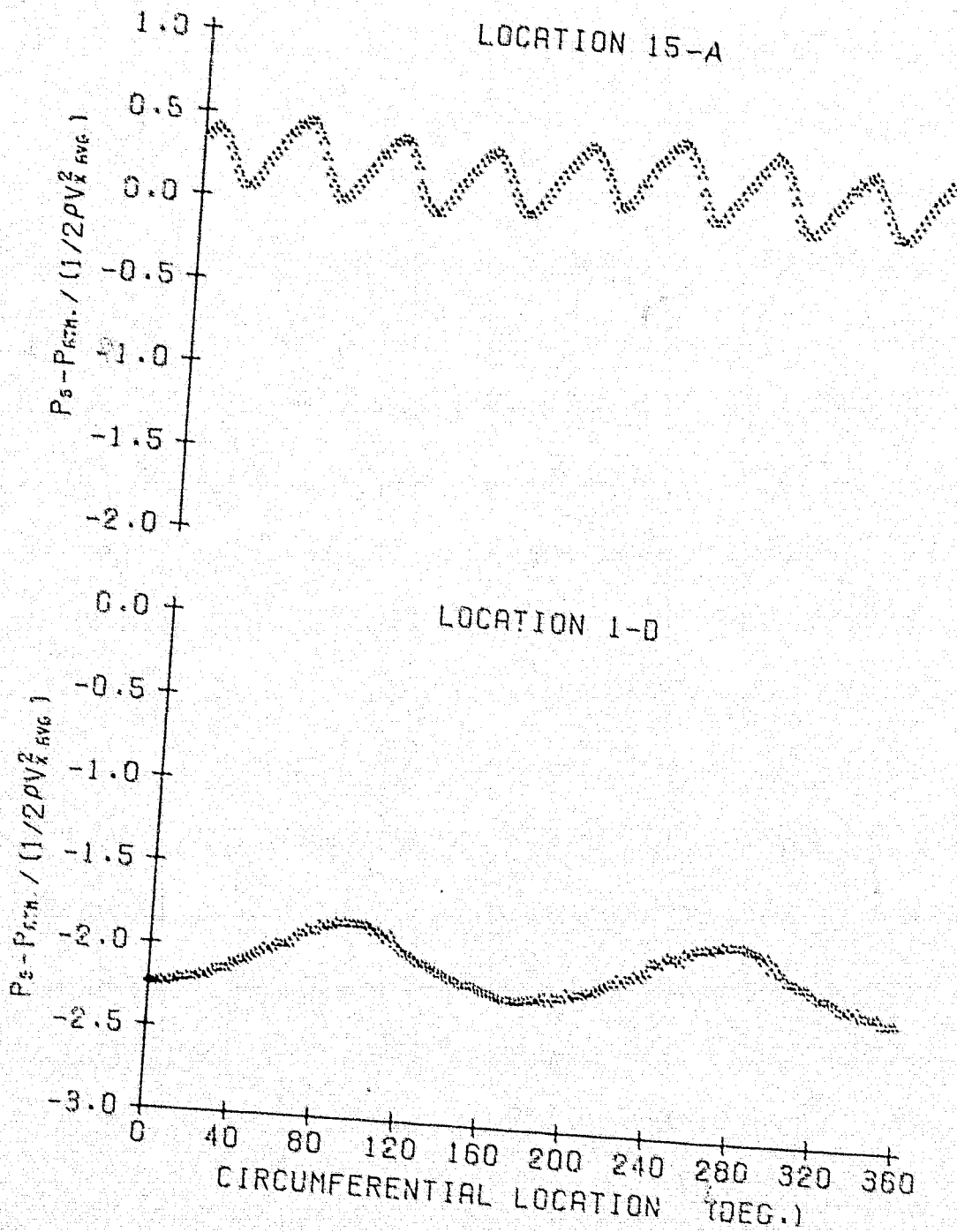


Figure C.35

10 October 1978
LCB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1842

AVG. FLOW COEF. = 0.514
AVG. P-RISE COEF. = 2.639
AVG. INCIDENCE = 6.64 DEG.

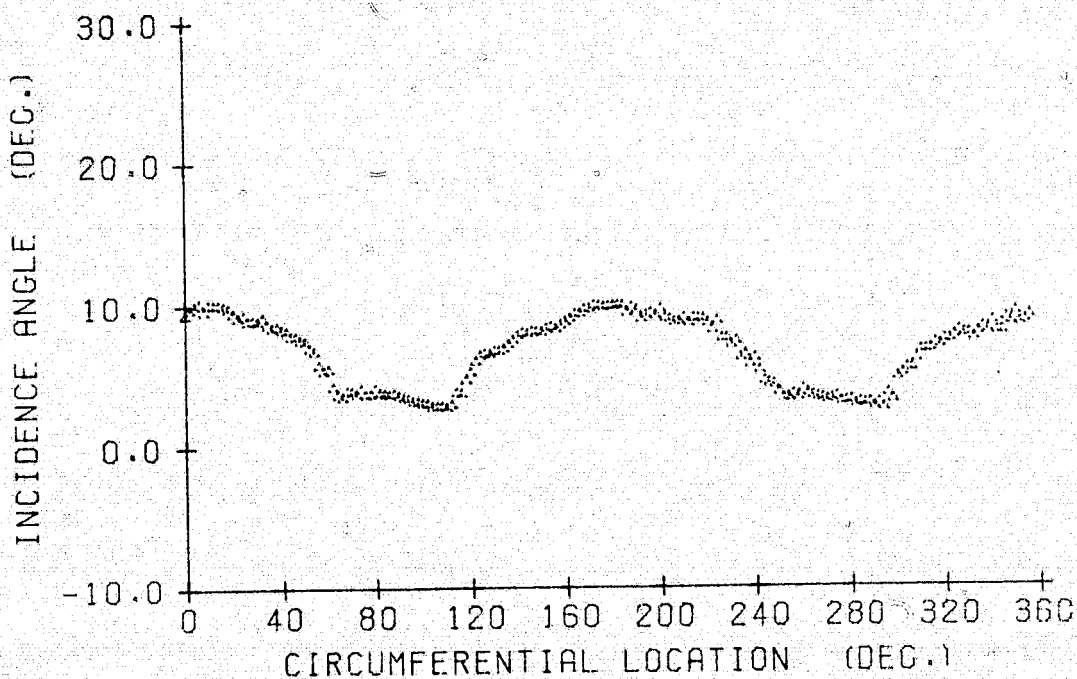


Figure C.36

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1704

AVG. FLOW COEF. = 0.537
AVG. P-RISE COEF. = 2.289
AVG. INCIDENCE = 5.59 DEG.

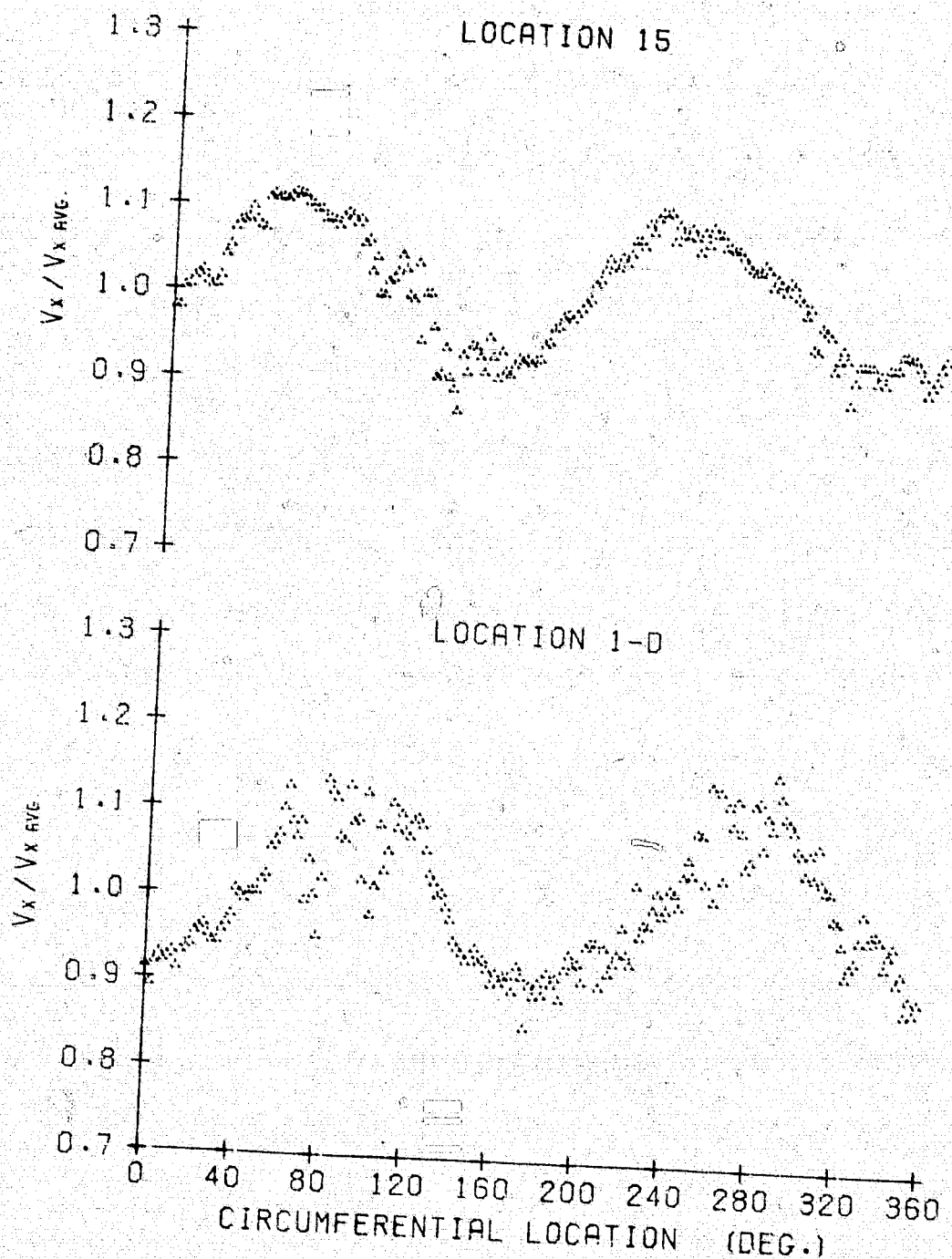


Figure C.37

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1704

AVG. FLOW COEF. = 0.537
AVG. P-RISE COEF. = 2.289
AVG. INCIDENCE = 5.59 DEG.

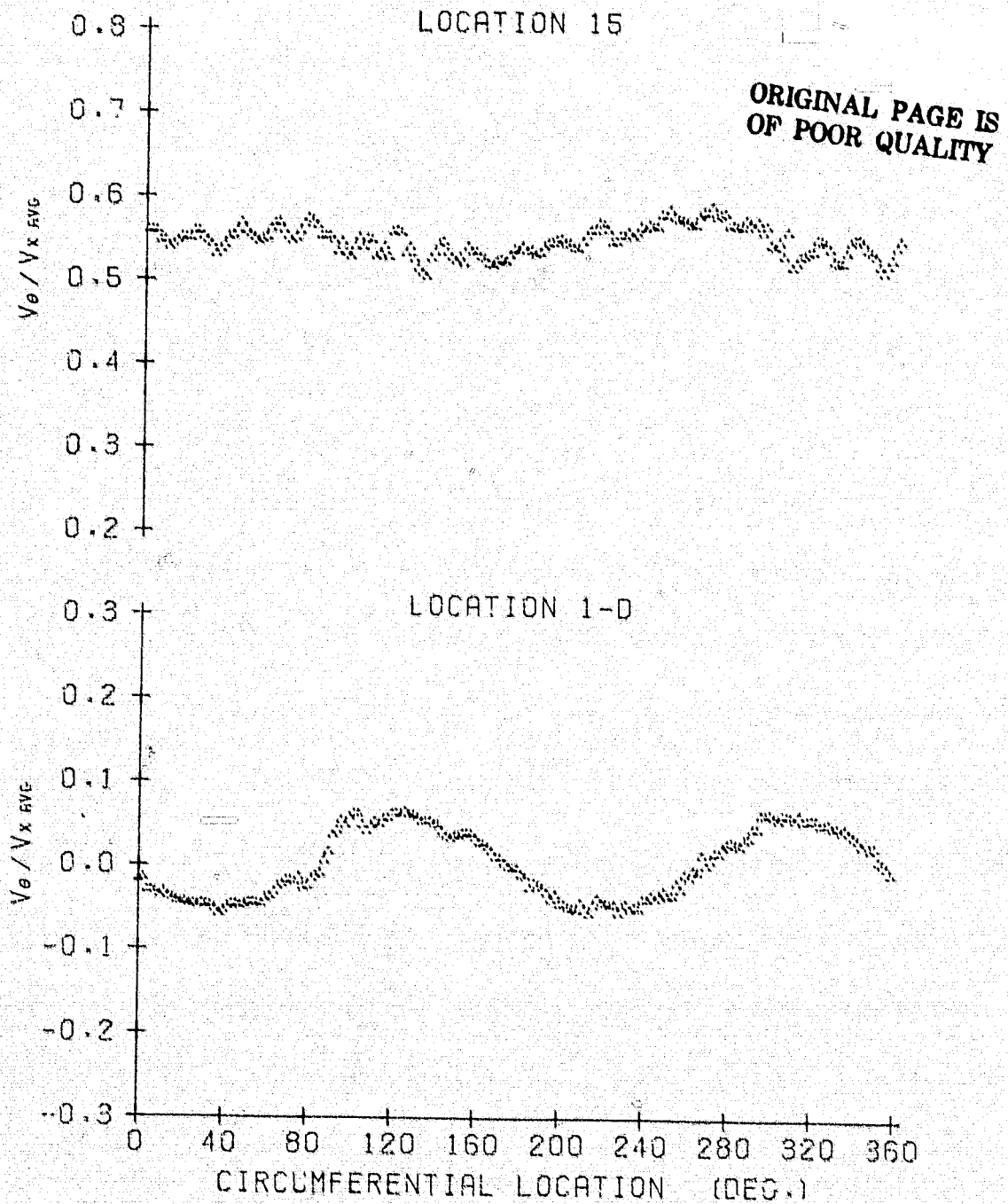


Figure C.38

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1704

AVG. FLOW COEF. = 0.537
AVG. P-RISE COEF. = 2.289
AVG. INCIDENCE = 5.59 DEG.

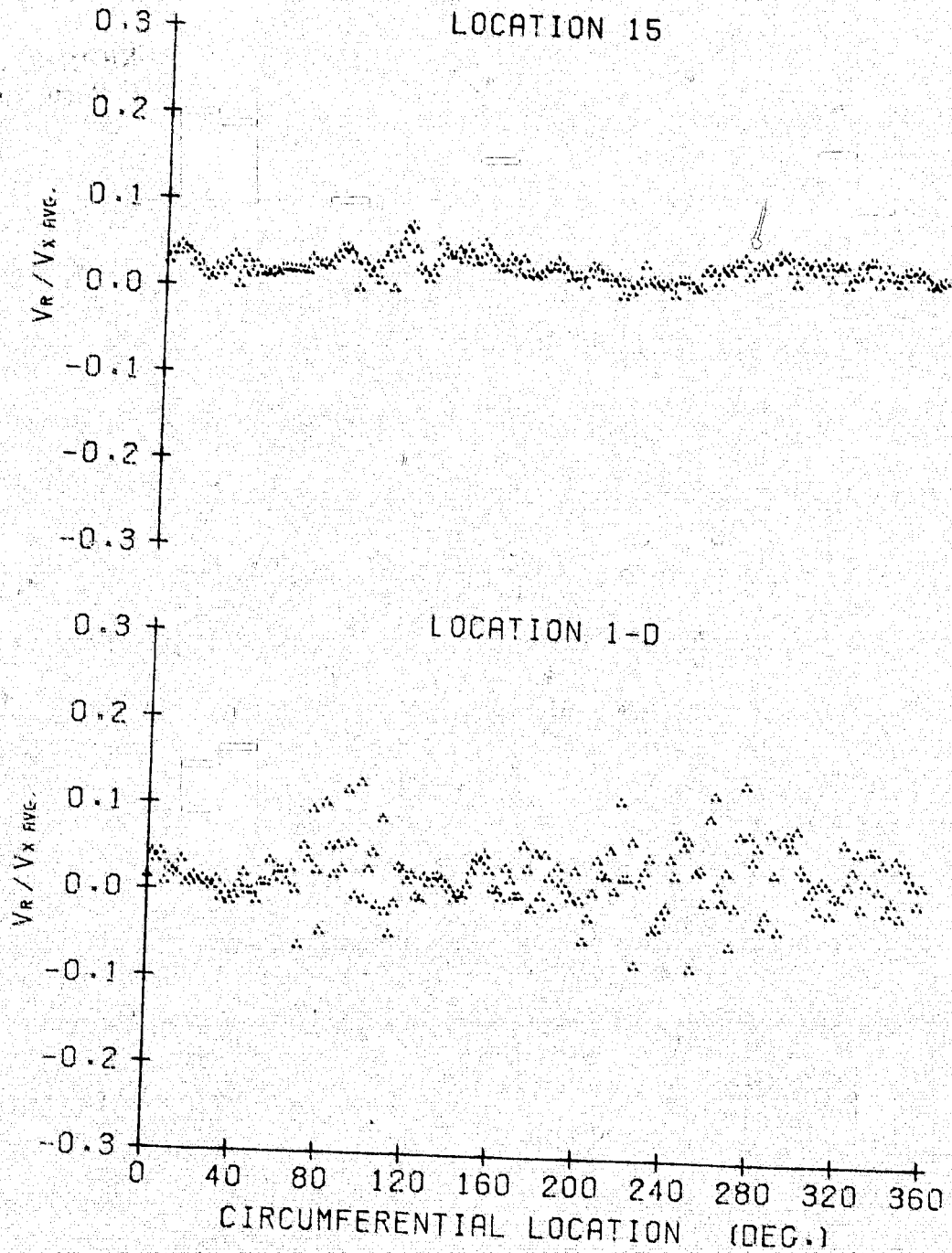


Figure C.39

10 October 1978

LGB:jep

9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1704

AVG. FLOW COEF. = 0.537
AVG. P-RISE COEF. = 2.289
AVG. INCIDENCE = 5.59 DEG.

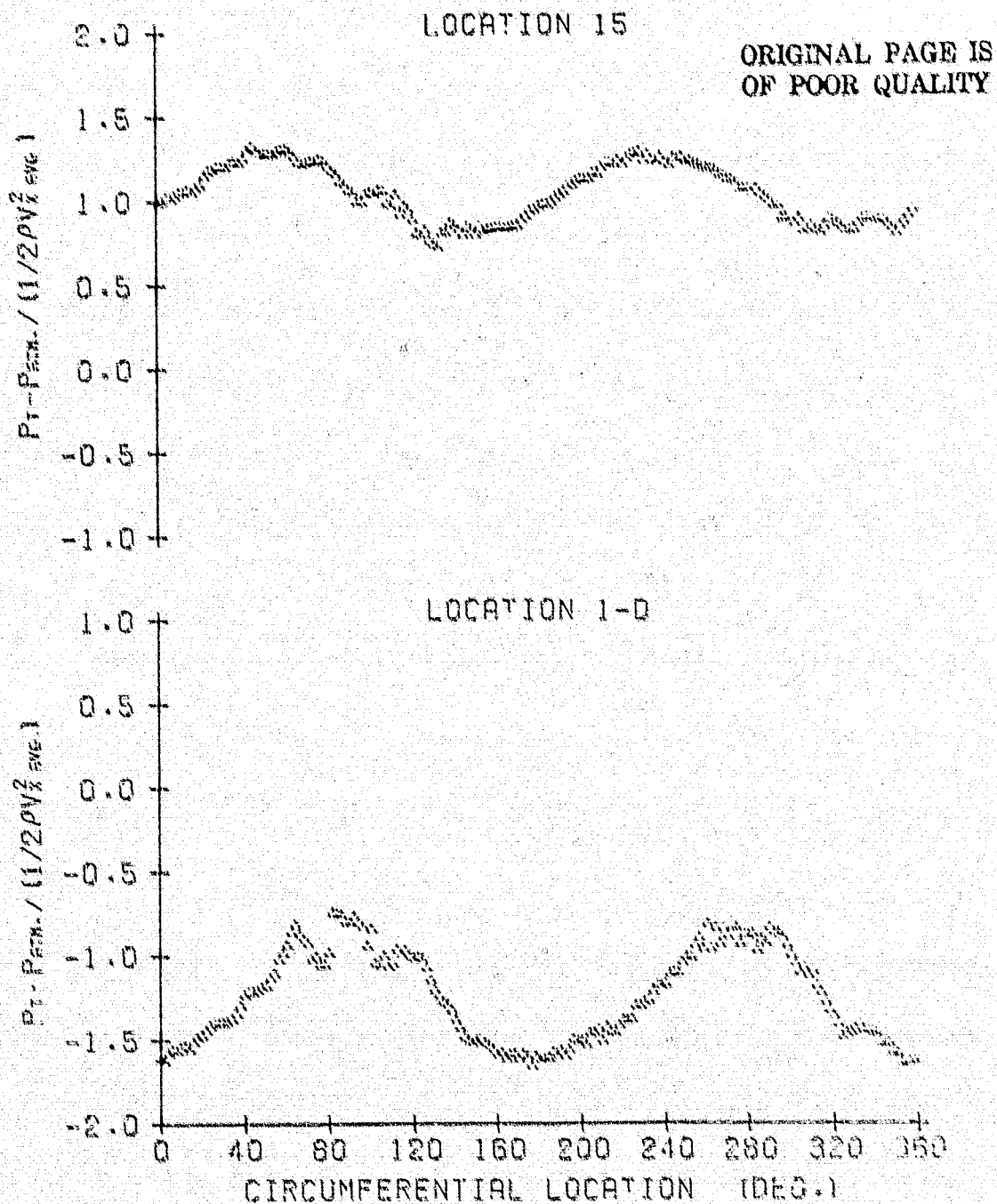


Figure G.40

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1704

AVG. FLOW COEF. = 0.537
AVG. P-RISE COEF. = 2.289
AVG. INCIDENCE = 5.59 DEG.

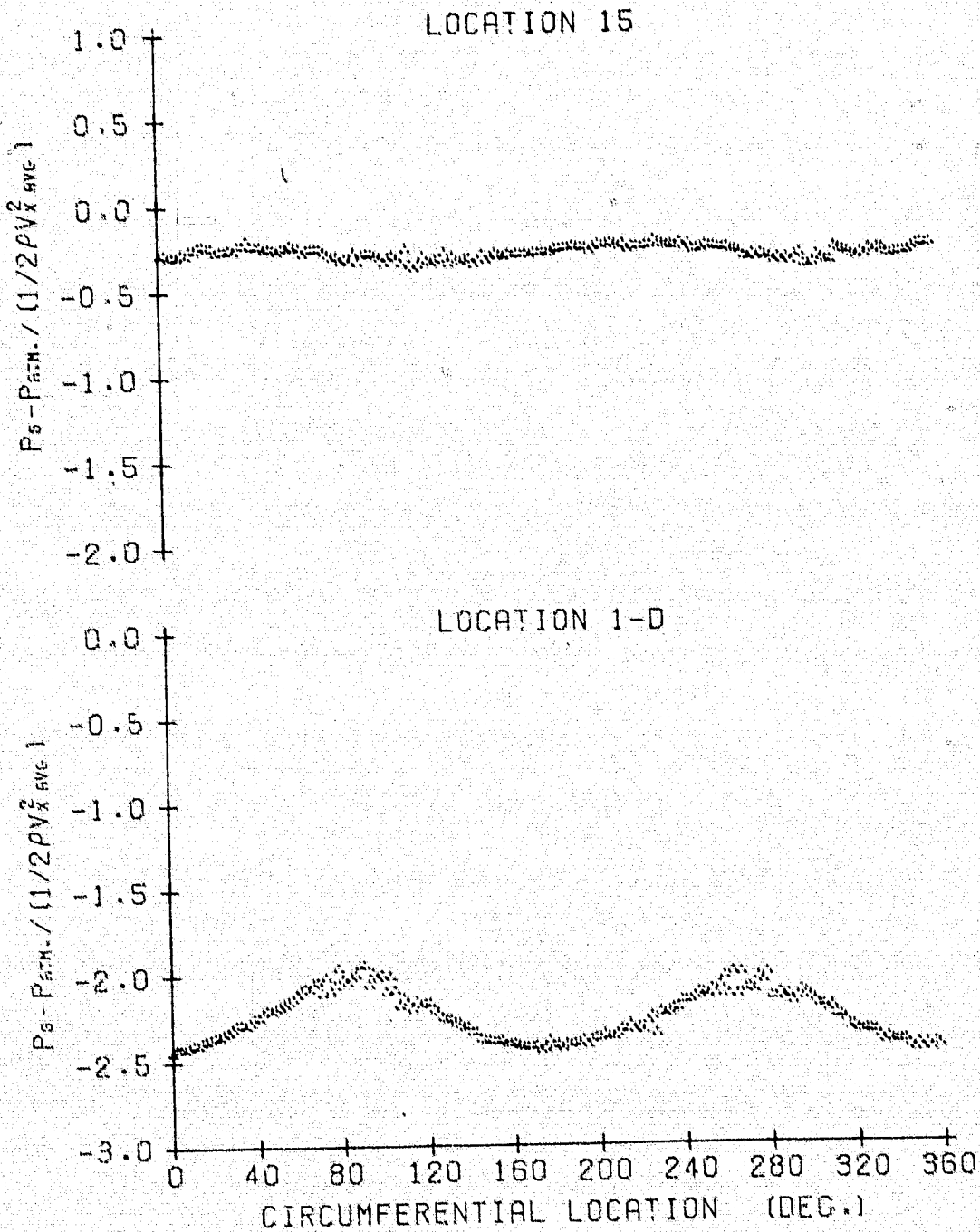


Figure C.41

10 October 1978
LCB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1704

AVG. FLOW COEF. = 0.537
AVG. P-RISE COEF. = 2.289
AVG. INCIDENCE = 5.59 DEG.

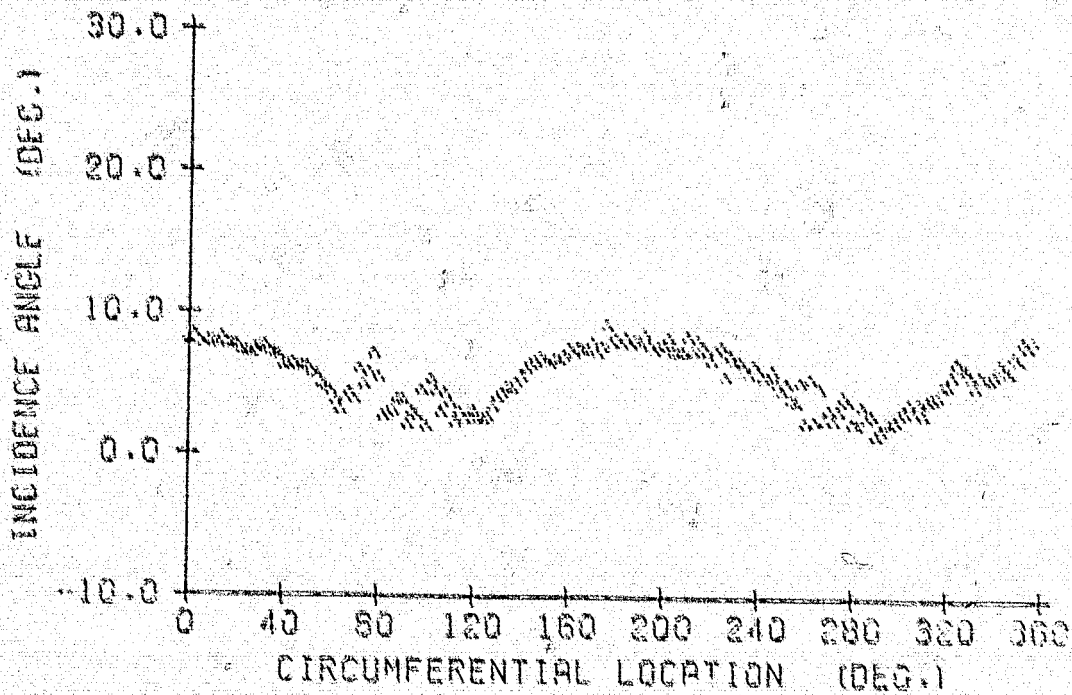


Figure C.42

10 October 1978
LCB:jep

0 BLADES
00 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1704

AVG. FLOW COEF. = 0.547
AVG. P-RISE COEF. = 2.131
AVG. INCIDENCE = 5.22 DEG.

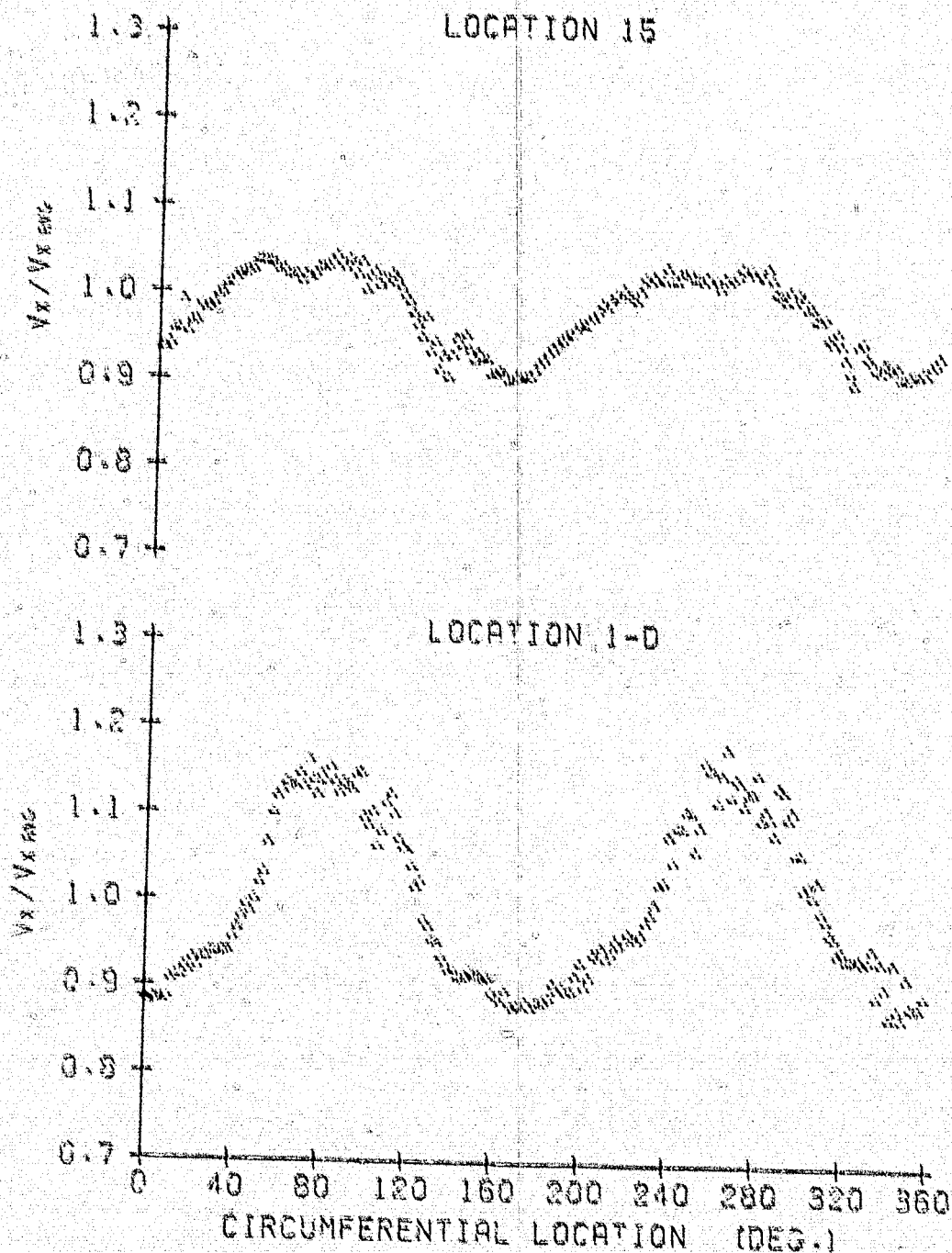


Figure 6.43

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1704

AVG. FLOW COEF. = 0.547
AVG. P-RISE COEF. = 2.131
AVG. INCIDENCE = 5.22 DEG.

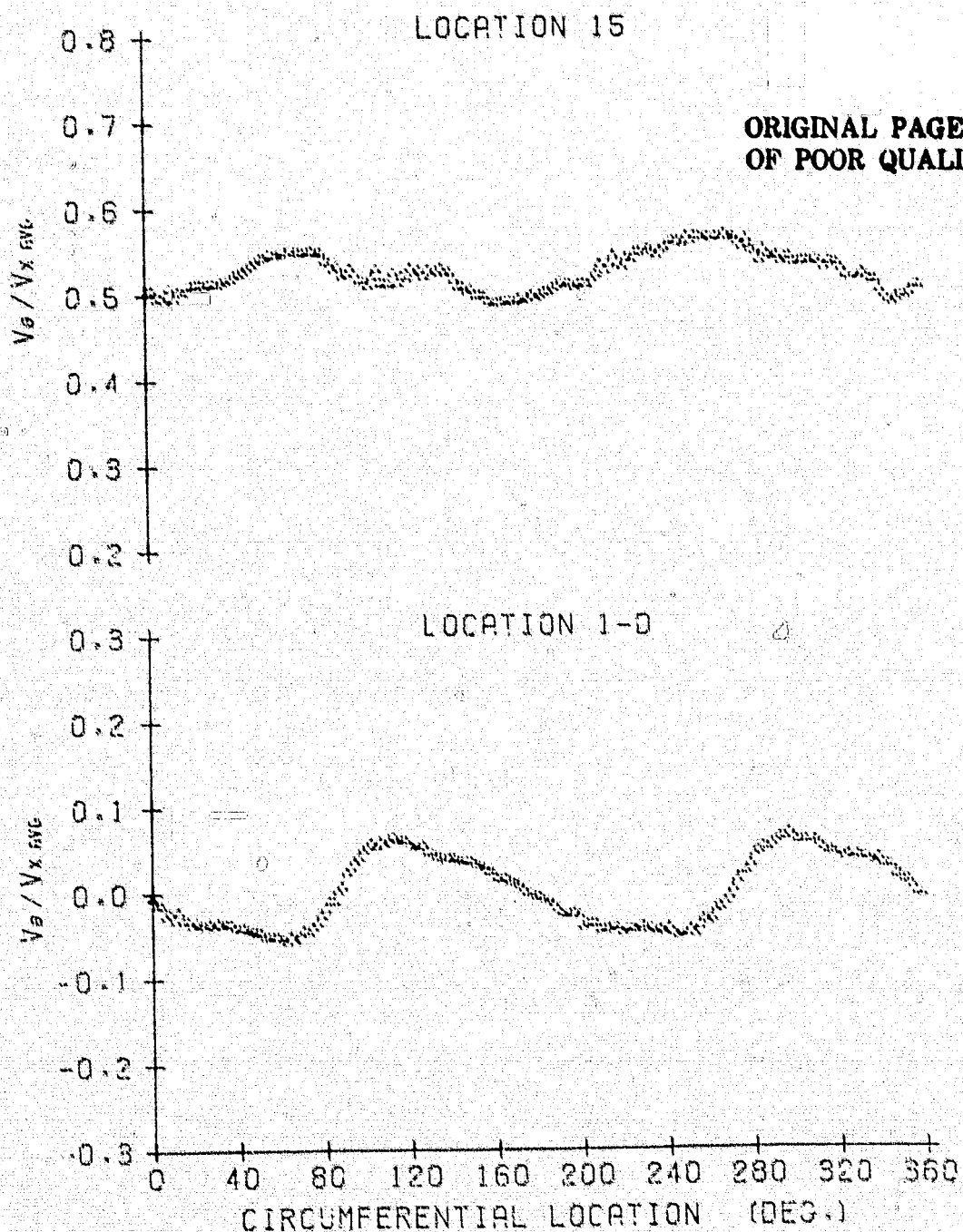


Figure C.44

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1704

AVG. FLOW COEF. = 0.547
AVG. P-RISE COEF. = 2.131
AVG. INCIDENCE = 5.22 DEG.

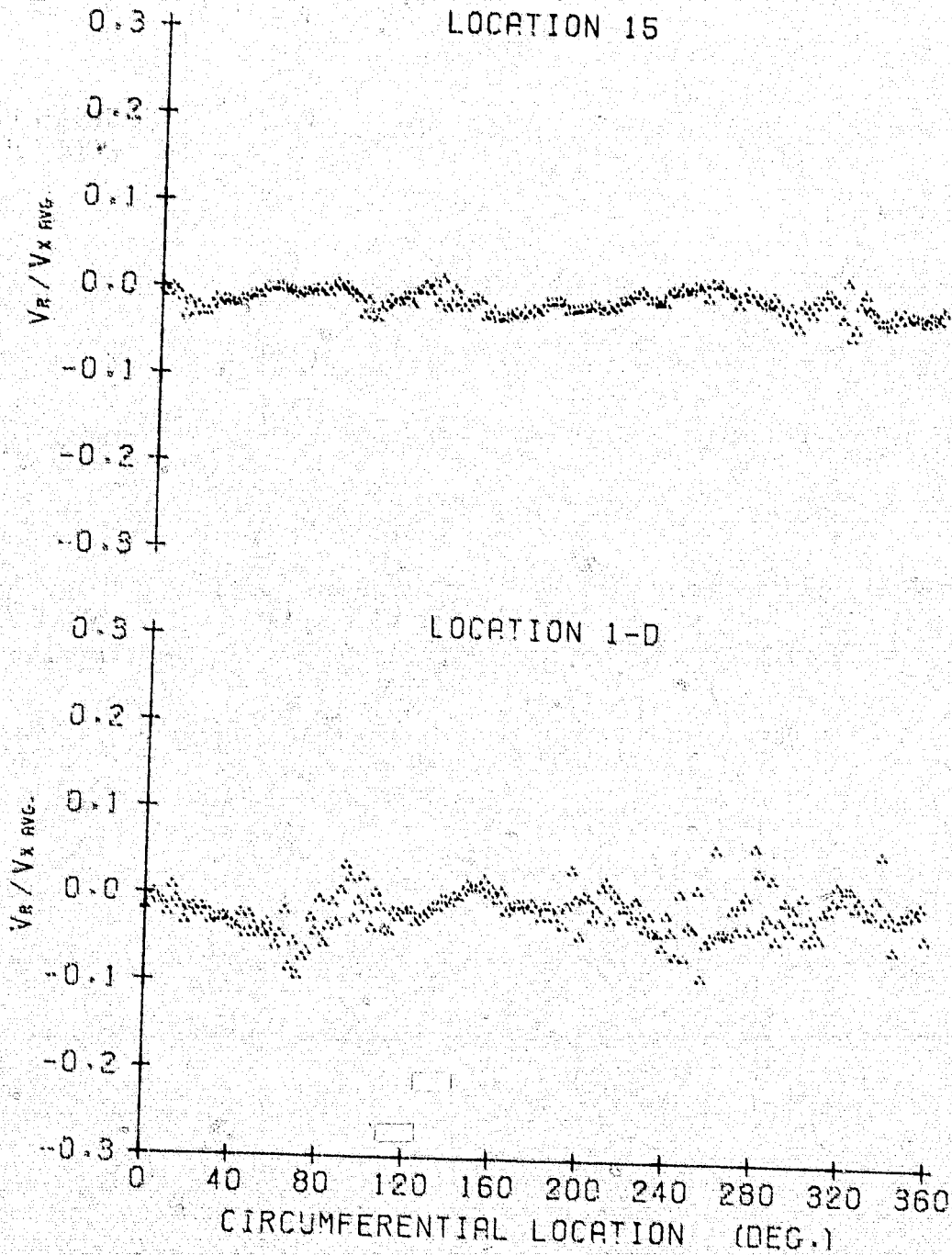


Figure C.45

9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1704

AVG. FLOW COEF. = 0.547
AVG. P-RISE COEF. = 2.131
AVG. INCIDENCE = 5.22 DEG.

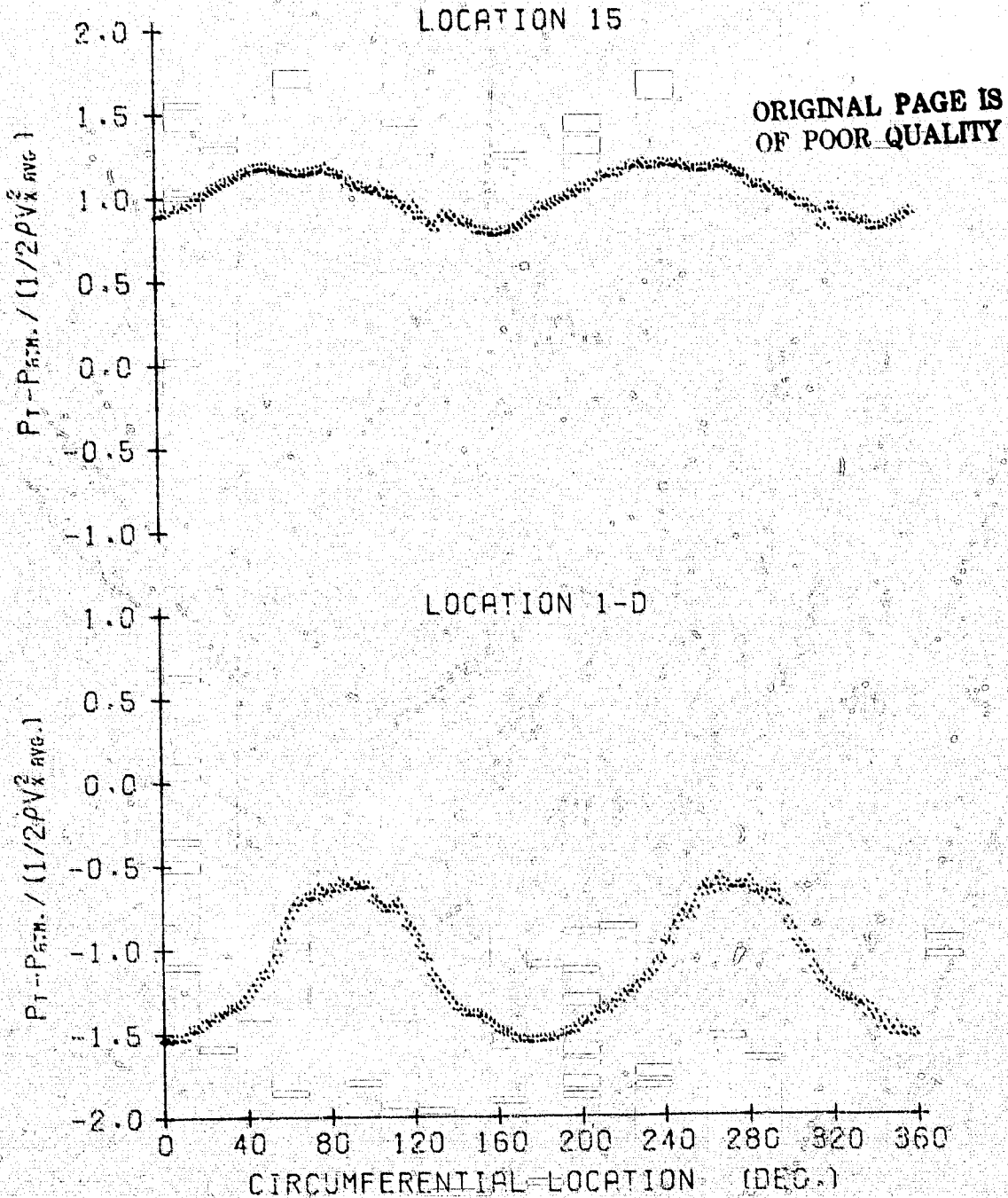


Figure C.46

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10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1704

AVG. FLOW COEF. = 0.547
AVG. P-RISE COEF. = 2.131
AVG. INCIDENCE = 5.22 DEG.

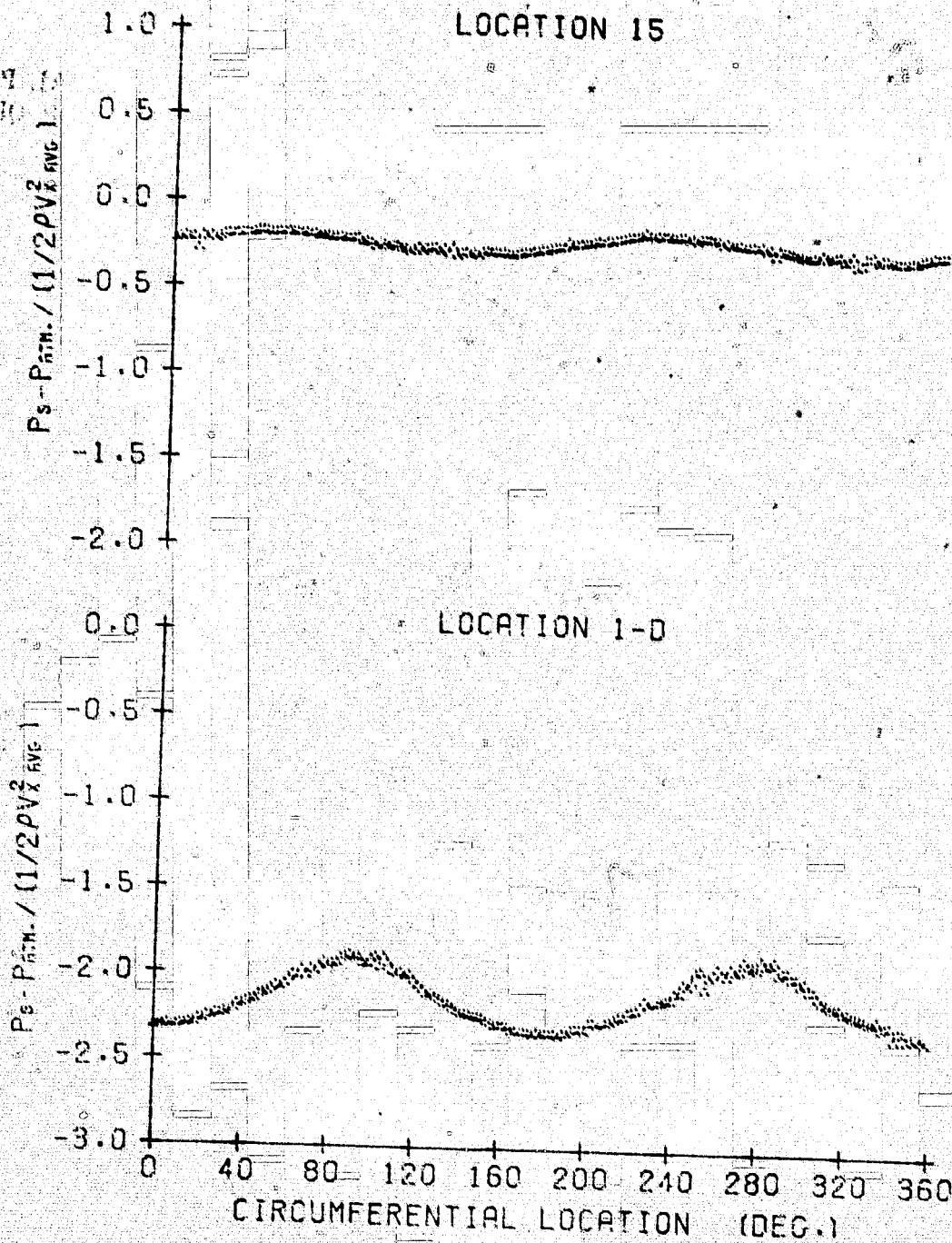


Figure C.47

10 October 1978

LCB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1704

AVG. FLOW COEF. = 0.547
AVG. P-RISE COEF. = 2.131
AVG. INCIDENCE = 5.22 DEG.

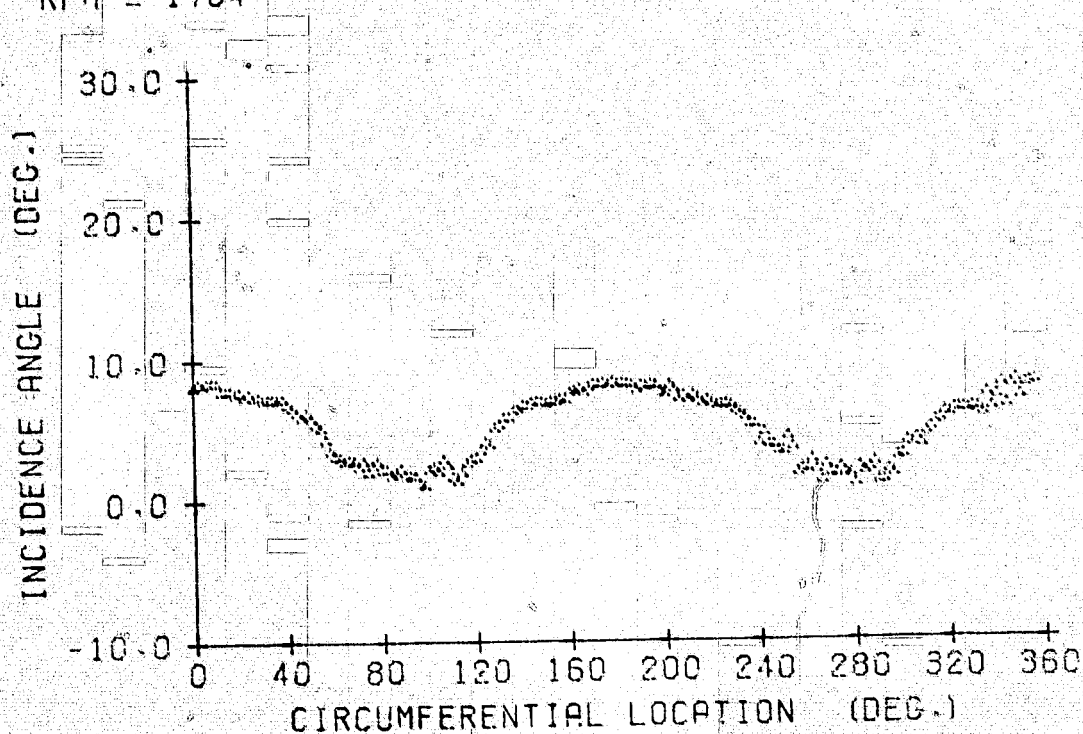


Figure C.48

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1704

AVG. FLOW COEF. = 0.567
AVG. P-RISE COEF. = 1.892
AVG. INCIDENCE = 4.22 DEG.

at 30% J.A. 1000
YTL 1000

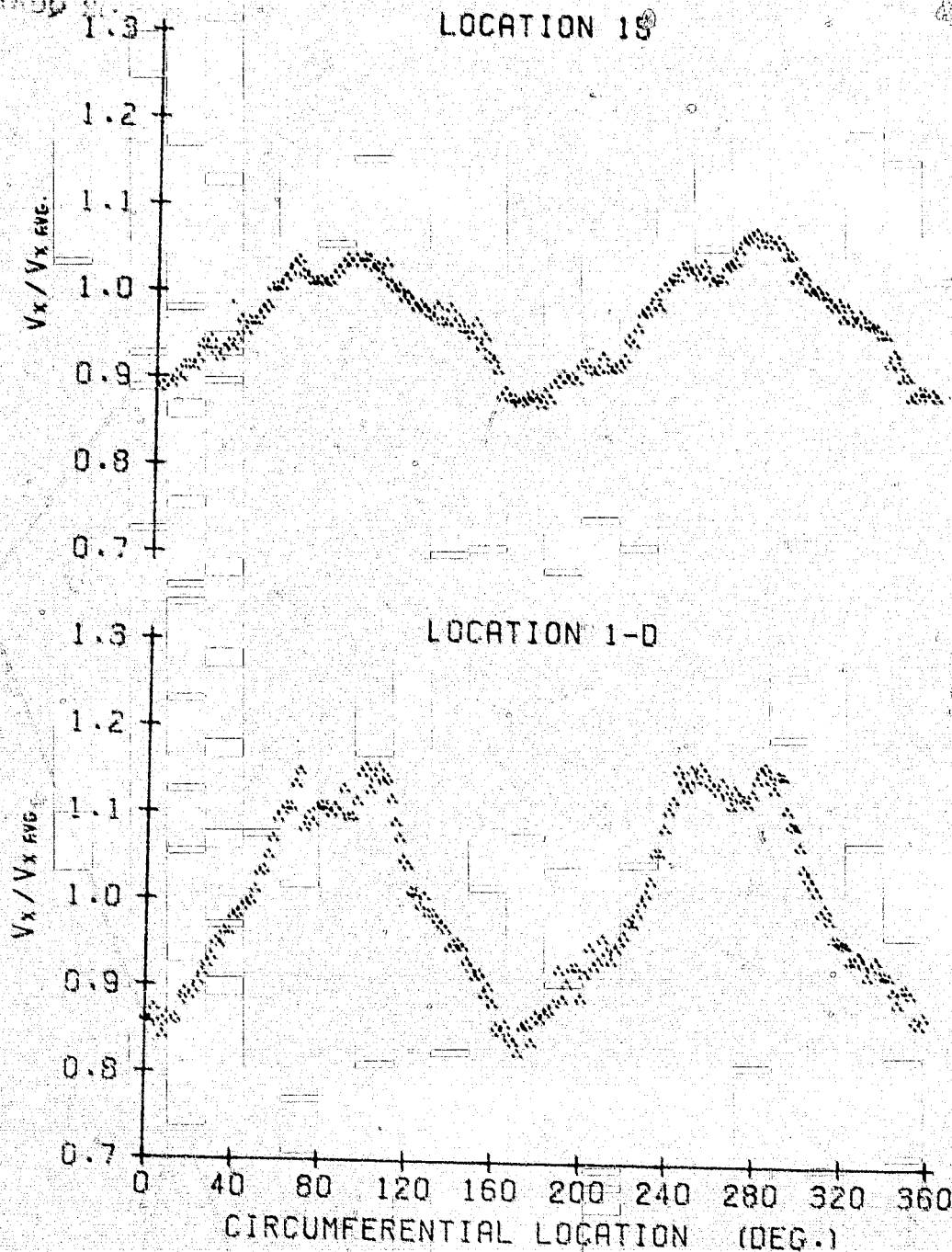


Figure C.49

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1704

AVG. FLOW COEF. = 0.567
AVG. P-RISE COEF. = 1.882
AVG. INCIDENCE = 4.22 DEG.

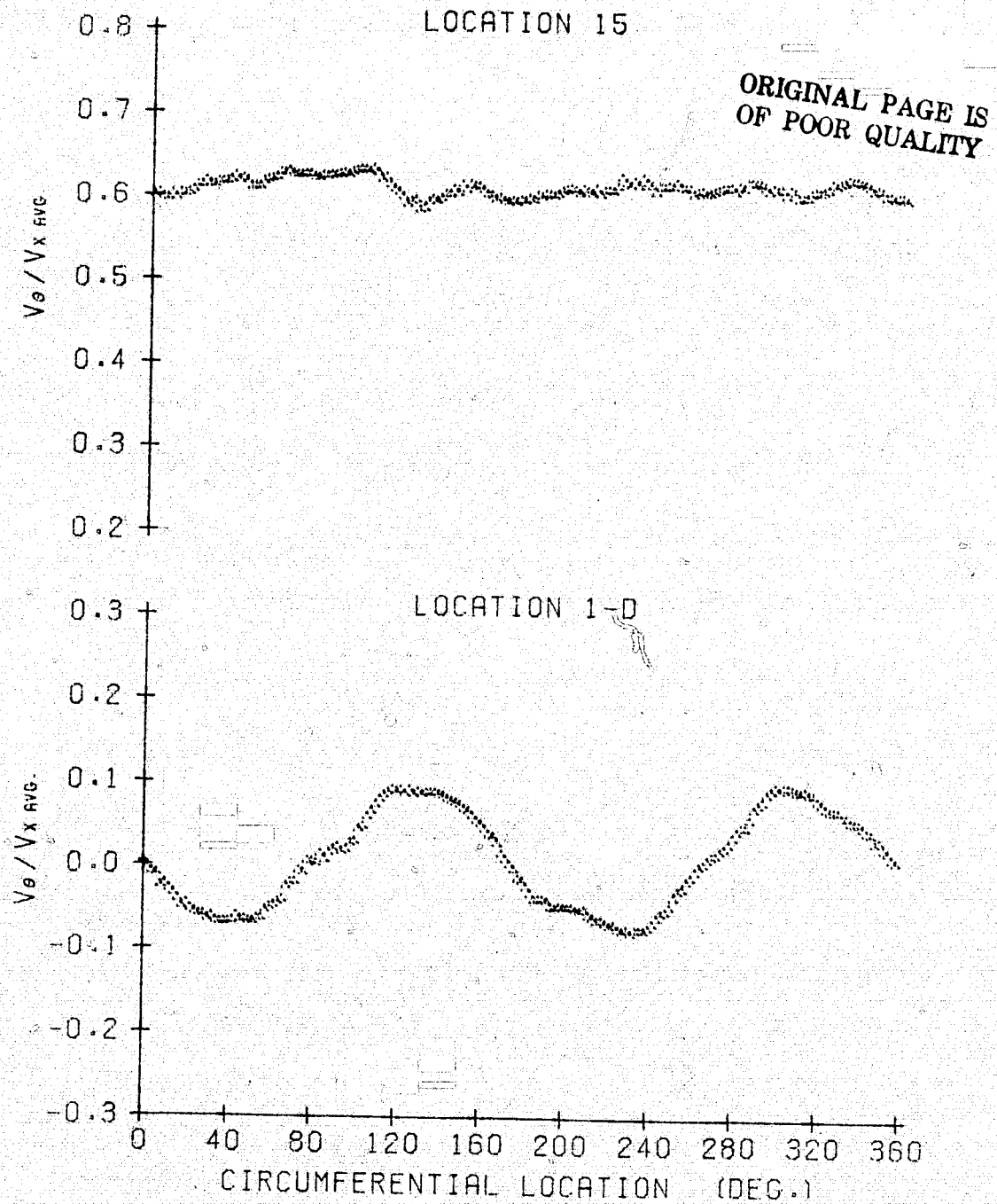


Figure C.50

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1704

AVG. FLOW COEF. = 0.567
AVG. P-RISE COEF. = 1.882
AVG. INCIDENCE = 4.22 DEG.

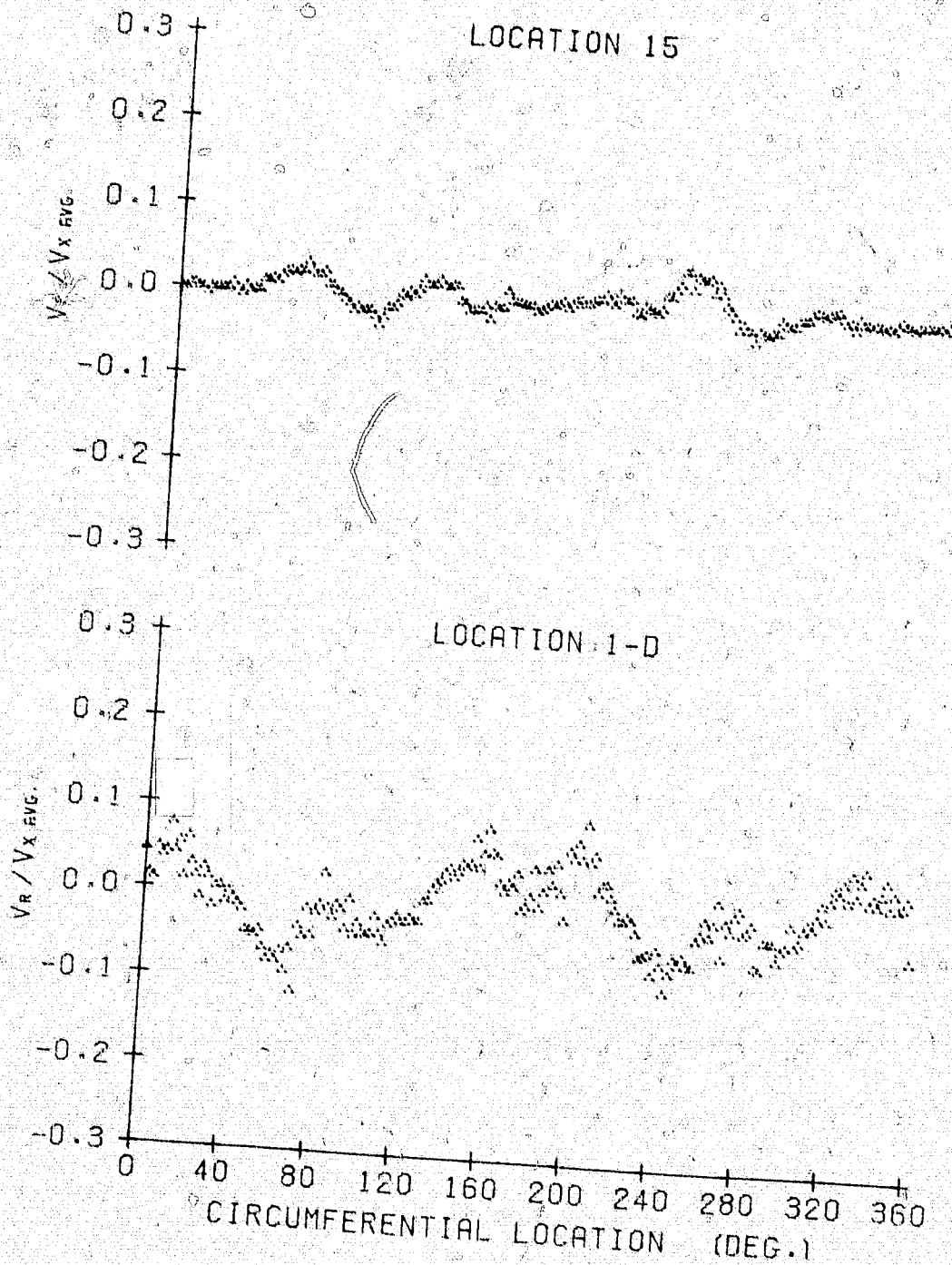


Figure C.51

10 October 1978

LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1704

AVG. FLOW COEF. = 0.567
AVG. P-RISE COEF. = 1.882
AVG. INCIDENCE = 4.22 DEG.

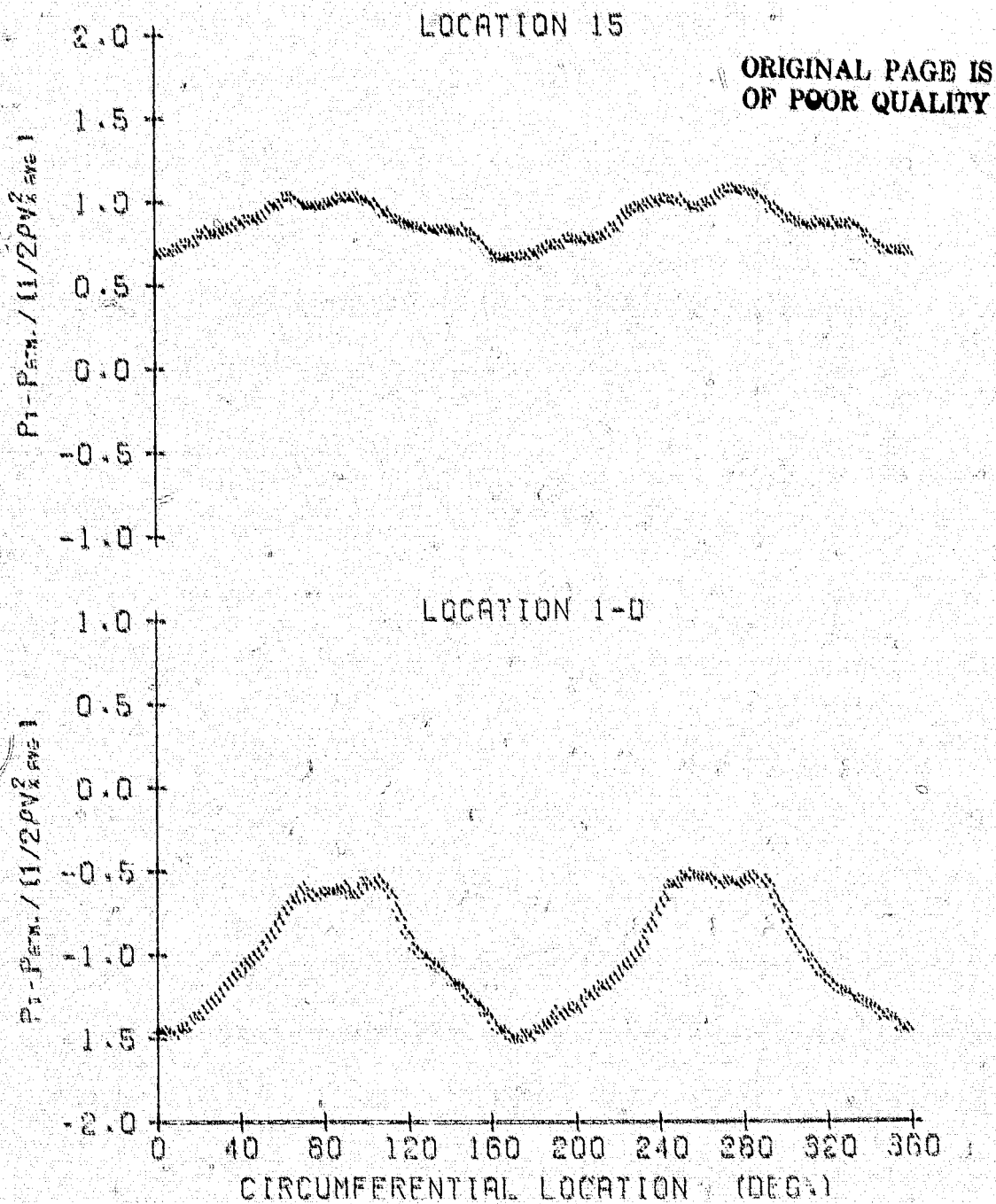


Figure C.52

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM : 1704

AVG. FLOW COEF. = 0.567
AVG. P-RISE COEF. = 1.882
AVG. INCIDENCE = 4.22 DEG.

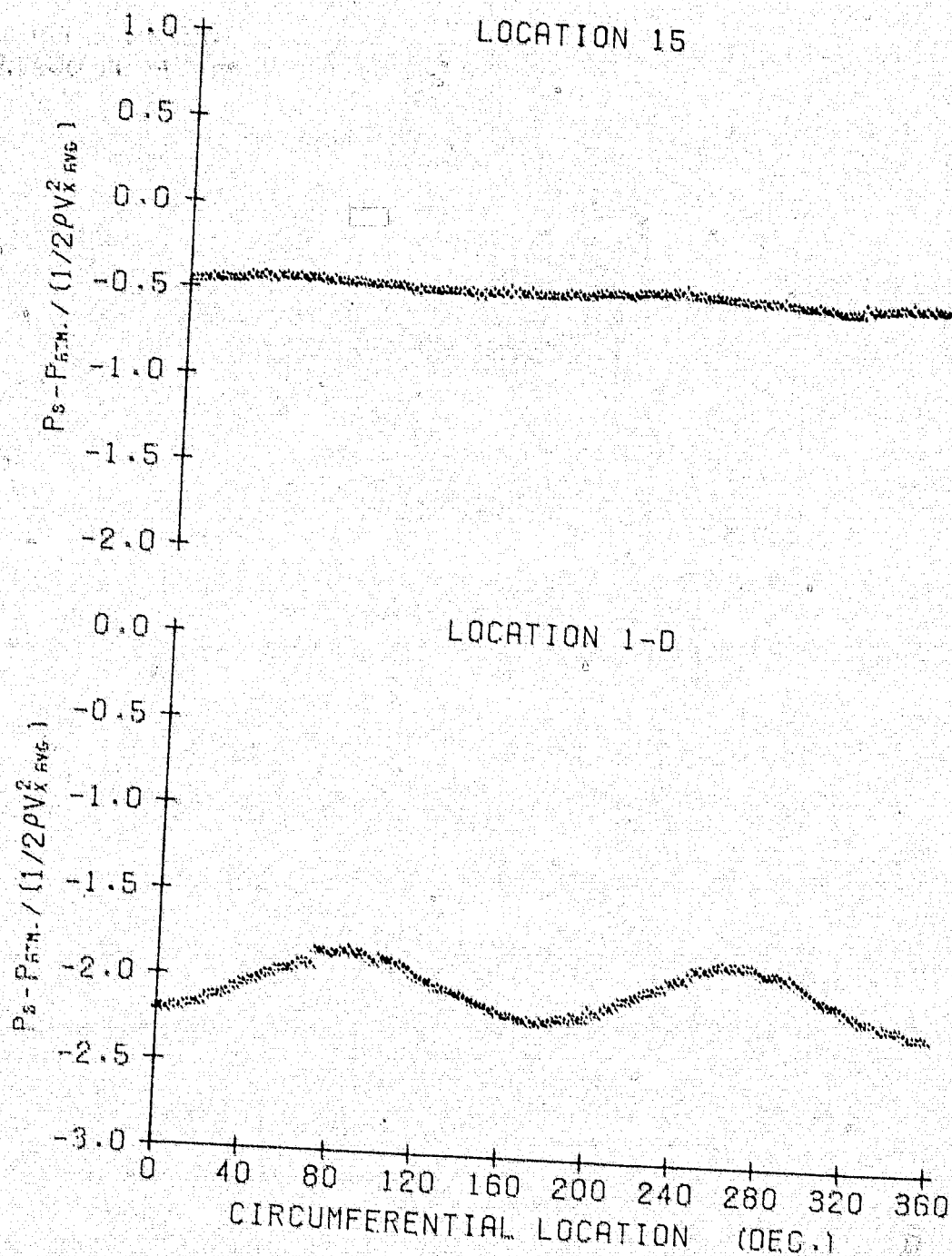


Figure C.53

10 October 1978
LCB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1704

AVG. FLOW COEF. = 0.567
AVG. P-RISE COEF. = 1.882
AVG. INCIDENCE = 4.22 DEG.

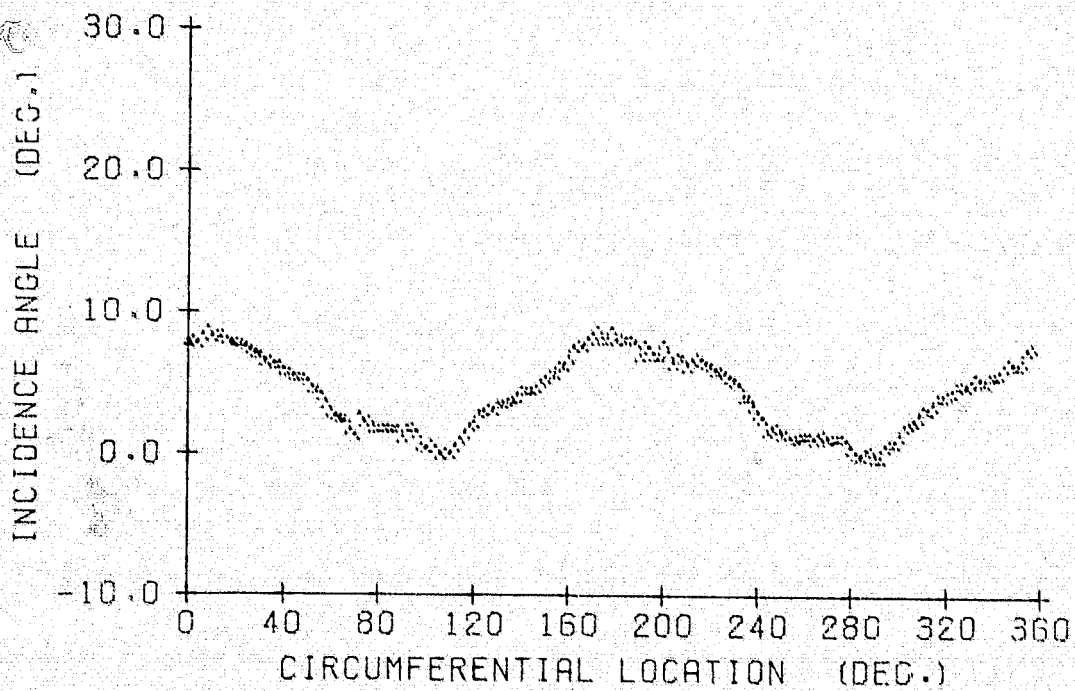


Figure C.54

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1704

AVG. FLOW COEFF. = 0.533
AVG. P-RISE COEFF. = 2.059
AVG. INCIDENCE = 5.81 DEG.

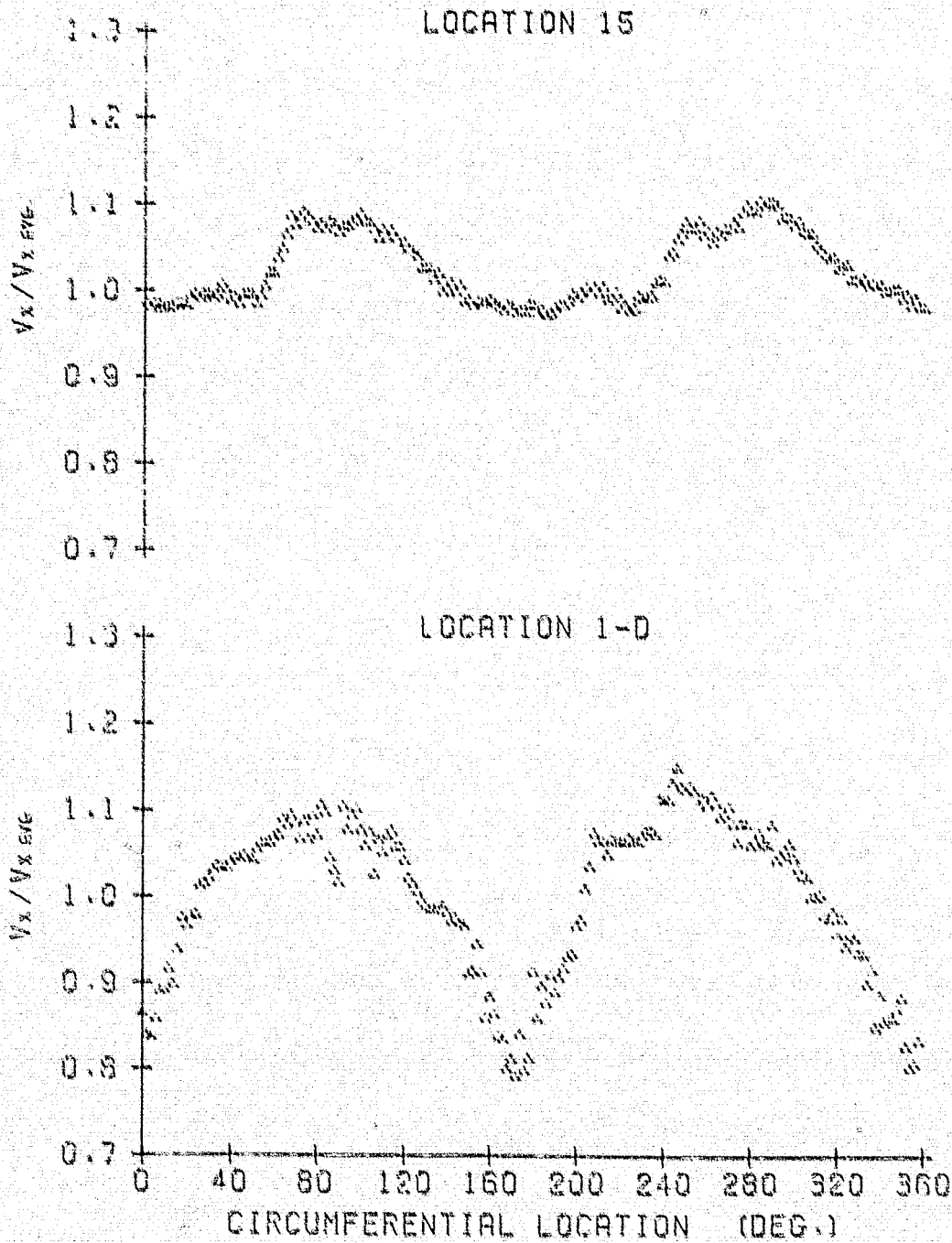


Figure C.55

10 October 1978

LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1704

AVG. FLOW COEF. = 0.533
AVG. P-RISE COEF. = 2.059
AVG. INCIDENCE = 5.81 DEG.

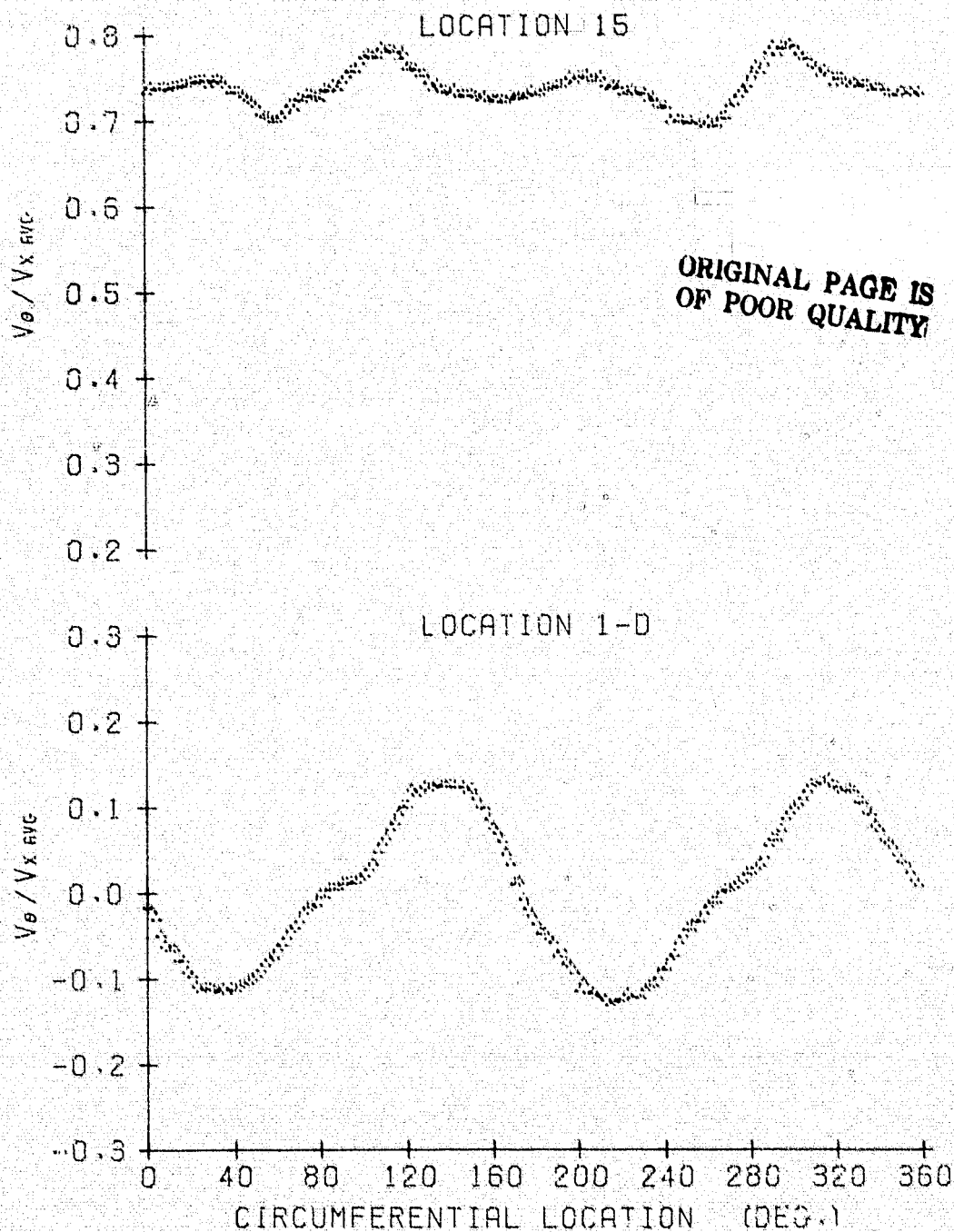


Figure C.56

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1704

AVG. FLOW COEF. = 0.533
AVG. P-RISE COEF. = 2.059
AVG. INCIDENCE = 5.81 DEG.

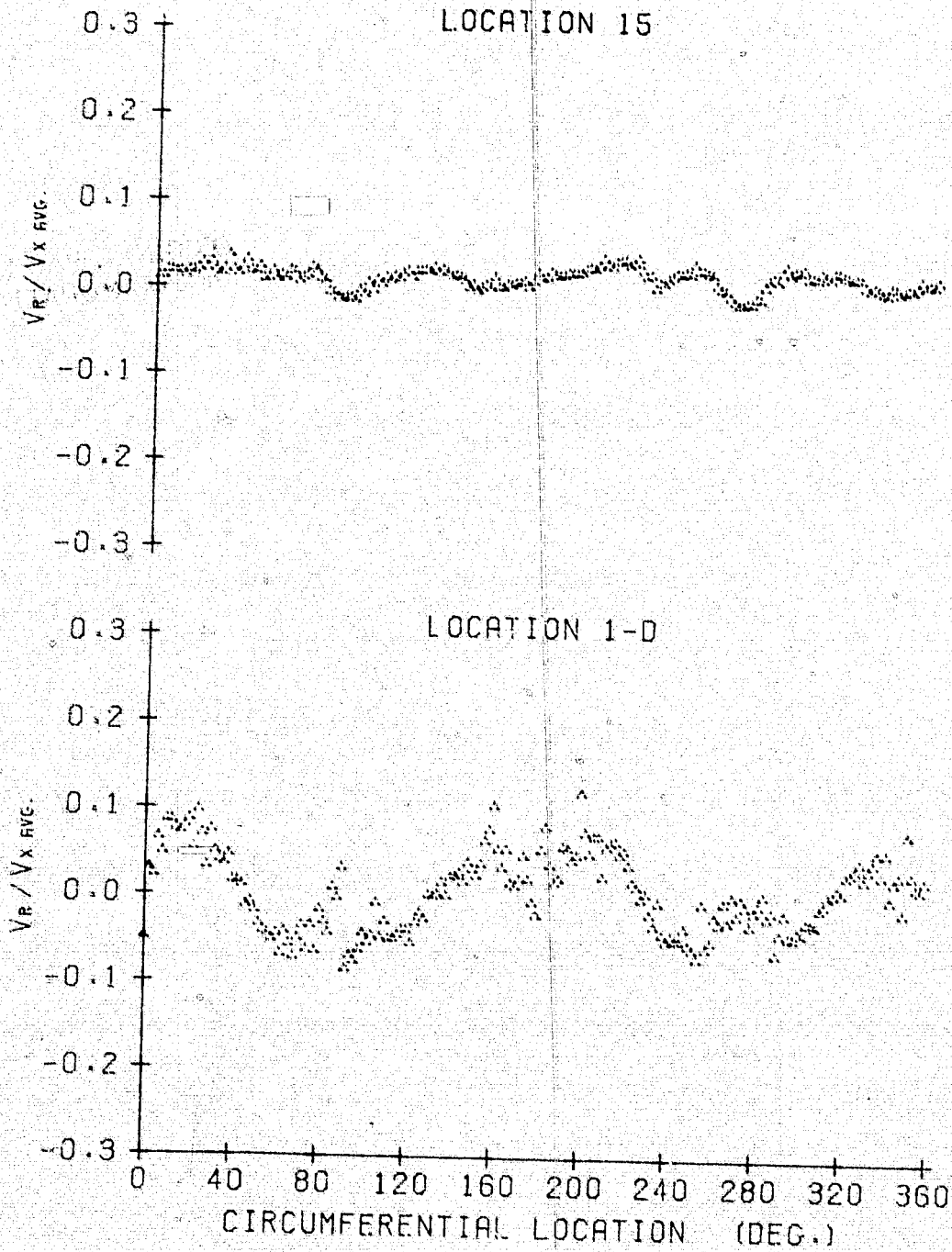


Figure C.57

9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1704

AVG. FLOW COEF. = 0.533
AVG. P-RISE COEF. = 2.059
AVG. INCIDENCE = 5.81 DEG.

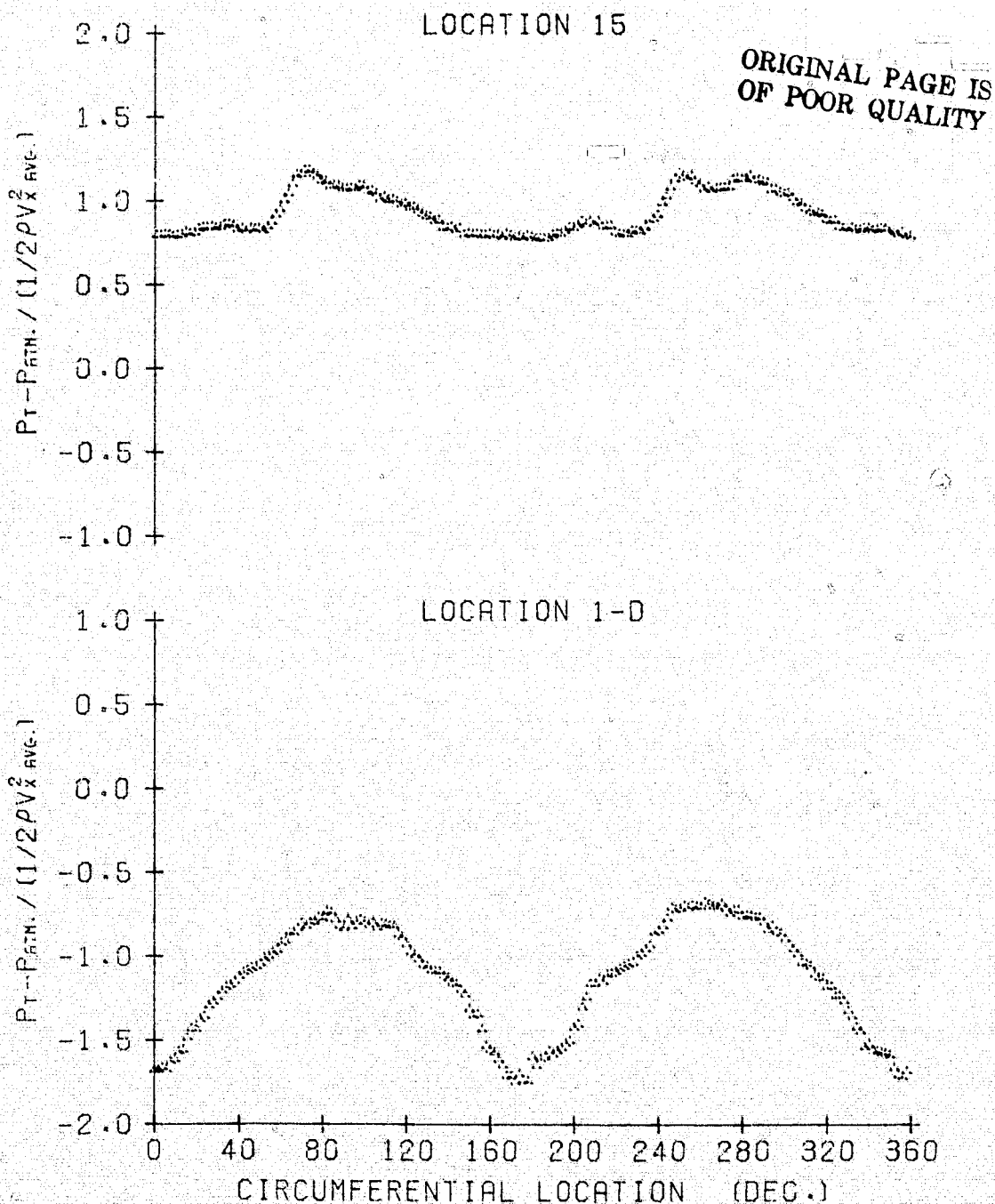


Figure C.58

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1704

AVG. FLOW COEF. = 0.533
AVG. P-RISE COEF. = 2.059
AVG. INCIDENCE = 5.81 DEG.

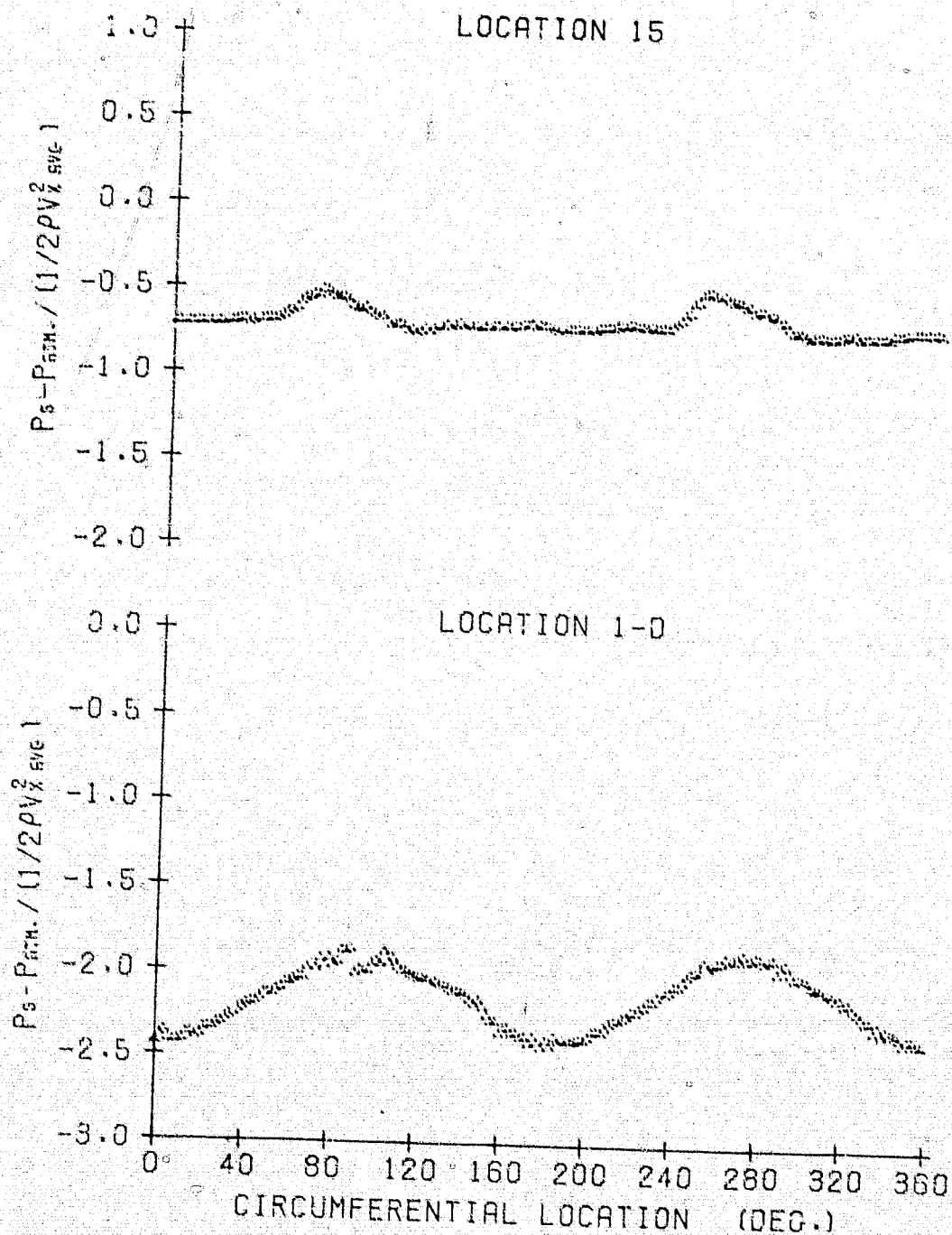


Figure C.59

10 October 1978
LCB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
2 CYCLE DISTORTION
RPM = 1704

AVG. FLOW COEF. = 0.533
AVG. P-RISE COEF. = 2.059
AVG. INCIDENCE = 5.81 DEG.

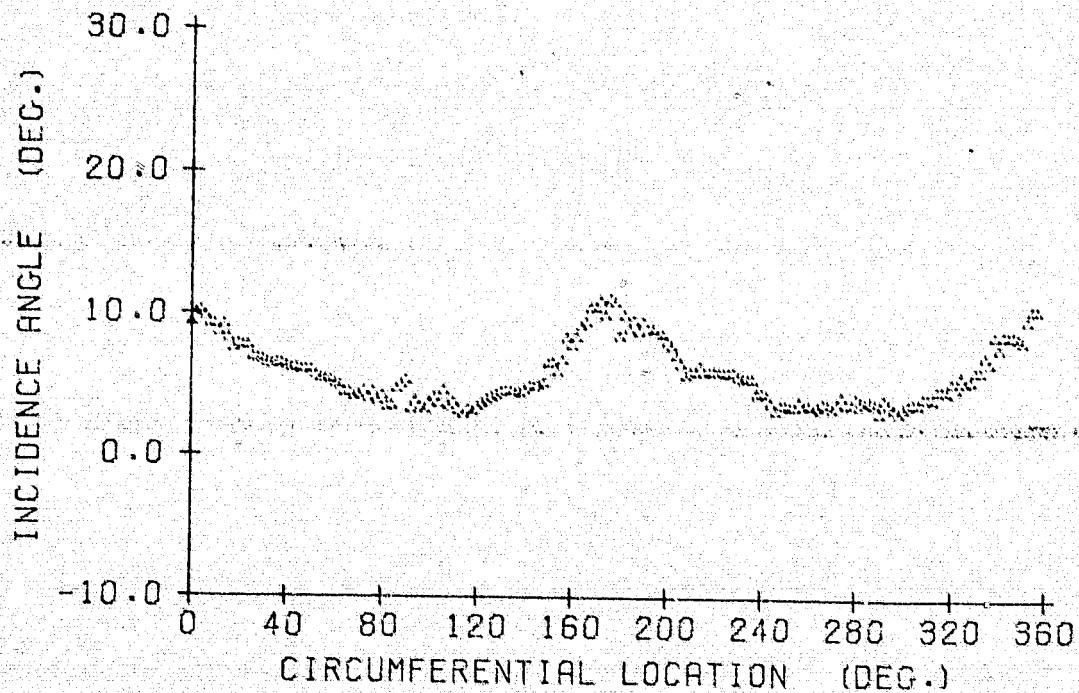


Figure C.60

Appendix D

Data for the Four-Cycle Sinusoidal Distortion

Table D.1

Test Conditions for the Four-Cycle Sinusoidal Distortion

Figure Numbers	Solidity	Rotor/Stator Spacing	Distance from Hub Surface
D.1-D.6	0.74	—	2.75 in. (6.985cm)
D.7-D.12	0.74	—	2.75 in.
D.13-D.18	0.74	—	2.75 in.
D.19-D.24	0.74	—	2.75 in.
D.25-D.30	0.74	—	2.75 in.
D.31-D.36	0.74	—	2.75 in.
D.37-D.42	0.74	—	2.75 in.
D.43-D.48	0.74	—	2.75 in.
D.49-D.54	1.11	12 in. (30.48cm)	2.75 in.
D.55-D.60	1.11	12 in.	2.75 in.
D.61-D.66	1.11	12 in.	2.75 in.
D.67-D.72	1.11	3 in. (7.62cm)	2.75 in.
D.73-D.78	1.11	3 in.	2.75 in.
D.79-D.84	1.11	3 in.	2.75 in.
D.85-D.90	0.90	12 in.	4.58 in. (11.64cm)
D.91-D.102	1.26	12 in.	3.67 in. (9.31cm)
D.103-D.108	1.45	12 in.	0.92 in. (2.33cm)

Table D.1 (con't)

Test Conditions for the Four-Cycle Sinusoidal Distortion

Figure Numbers	No. of Blades	Stagger Angle (degrees)	$V_{xavginlet}$ (ft/sec)	$V_{xavgexit}$ (ft/sec)	RPM	Average ϕ	Average $\Delta P_T / \frac{1}{2} \rho V_{xavg}^2$	Average Incidence (degrees)
D.1-D.6	6	35	60.09	60.73	682	1.303	0.023	2.29
D.7-D.12	6	35	63.14	63.10	941	0.992	0.454	10.12
D.13-D.18	6	35	65.27	65.29	1203	0.802	1.004	16.24
D.19-D.24	6	45	64.93	64.54	975	0.985	0.014	0.40
D.25-D.30	6	45	64.62	64.46	1293	0.739	0.660	8.50
D.31-D.36	6	55	63.59	64.15	1392	0.675	0.093	0.57
D.37-D.42	6	55	57.66	61.33	1622	0.526	0.848	6.78
D.43-D.48	6	55	63.80	65.60	1913	0.493	1.732	8.35
D.49-D.54	9	50	62.53	62.52	1492	0.620	1.281	1.88
D.55-D.60	9	50	60.34	57.99	1663	0.536	2.248	5.47
D.61-D.66	9	50	59.86	57.30	1798	0.492	2.951	7.50
D.67-D.72	9	50	61.58	64.17	1492	0.610	1.356	2.41
D.73-D.78	9	50	60.02	57.94	1663	0.534	2.252	5.70
D.79-D.84	9	50	59.50	58.18	1798	0.489	2.968	7.74
D.85-D.90	9	50	60.08	60.29	1663	0.534	2.313	5.77
D.91-D.96	9	50	59.55	58.85	1663	0.529	2.321	5.97
D.97-D.102	9	50	62.08	60.77	1663	0.552	1.997	4.87
D.103-D.108	9	50	58.33	61.20	1663	0.519	2.198	6.46

10 October 1978
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6 BLADES
35 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 682

AVG. FLOW COEF. = 1.303
AVG. P-RISE COEF. = 0.023
AVG. INCIDENCE = 2.29 DEG.

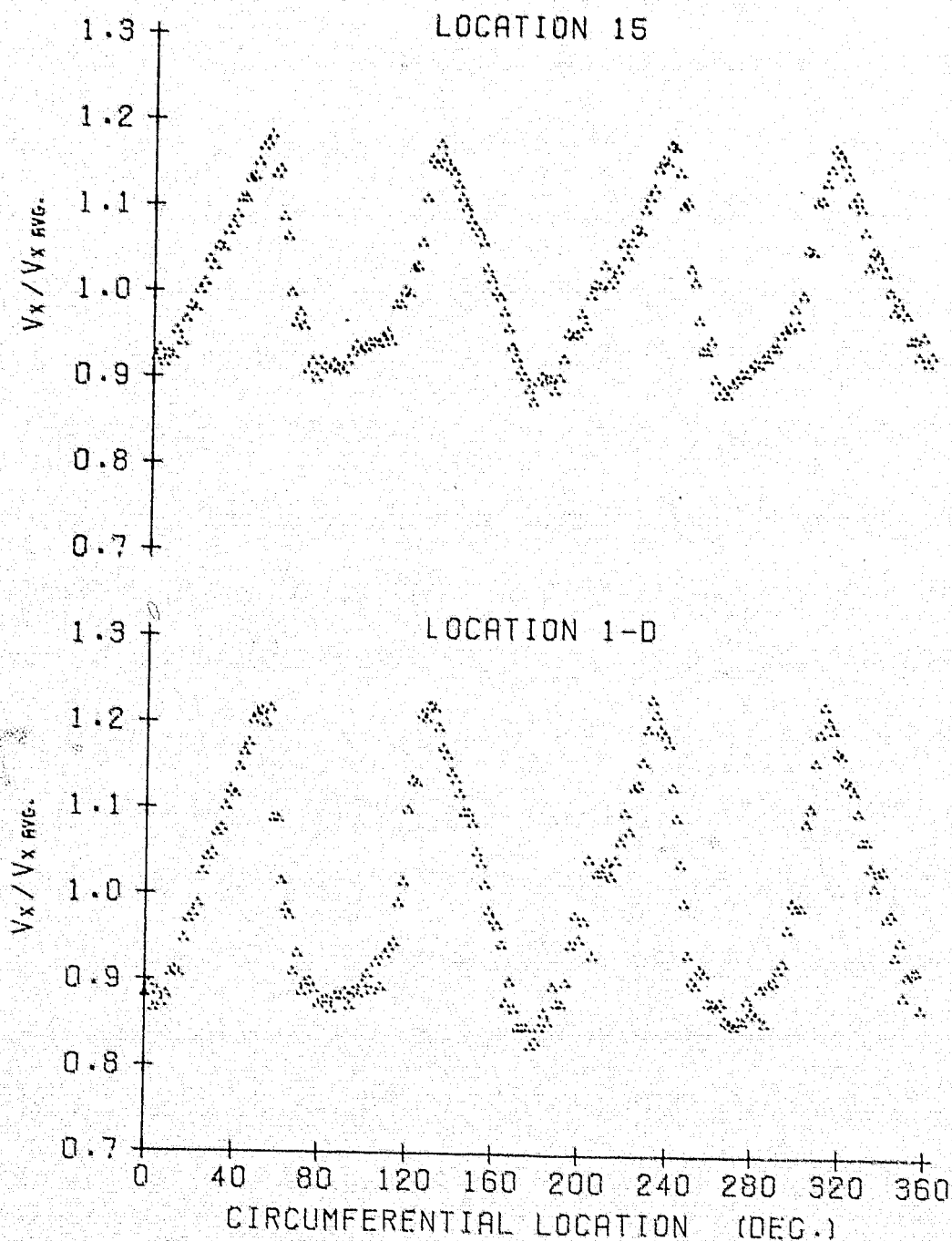


Figure D.1

10 October 1978
LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 682

AVG. FLOW COEFF. = 1.303
AVG. P-RISE COEFF. = 0.023
AVG. INCIDENCE = 2.29 DEG.

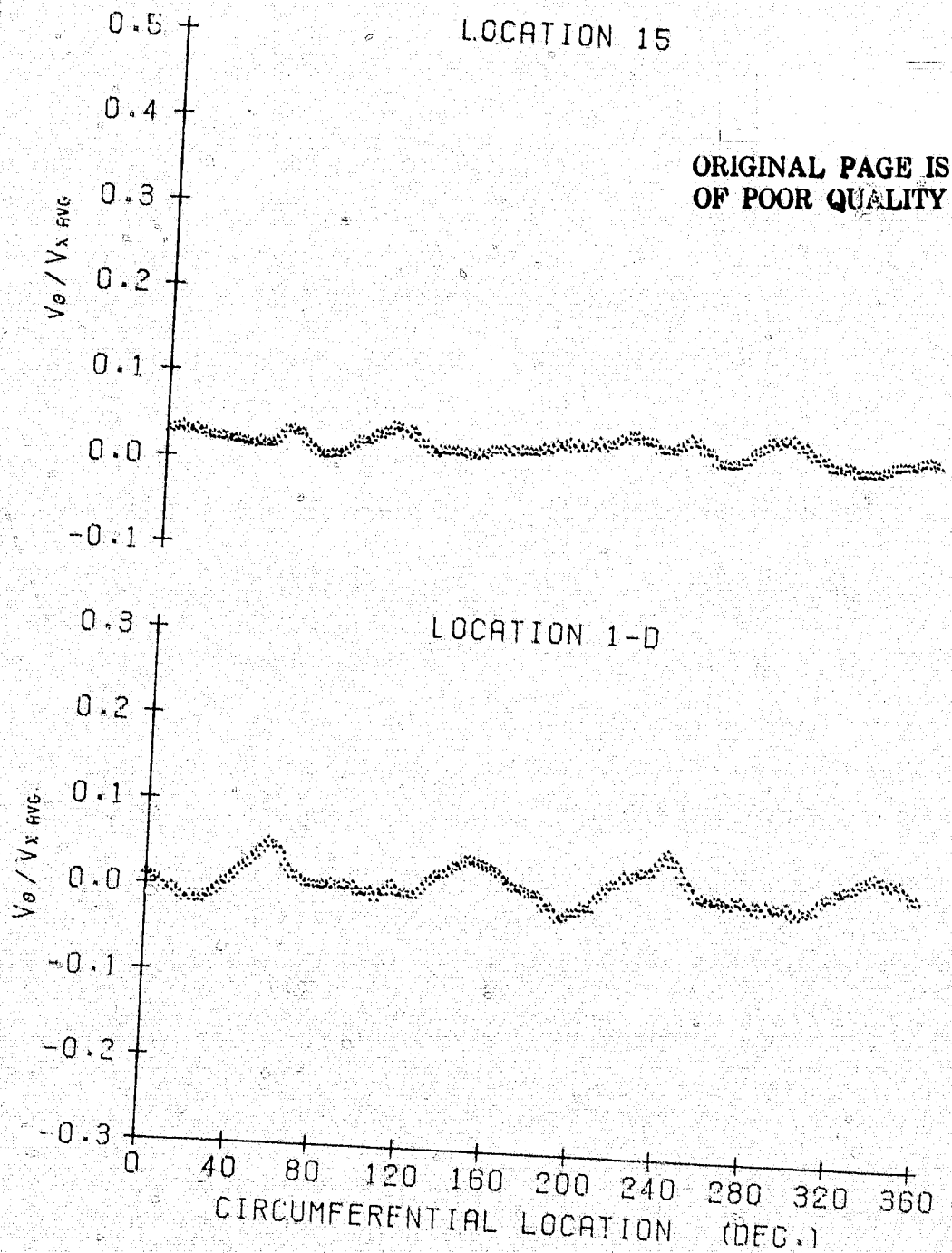


Figure D.2

10 October 1978
LCB:jap

6 BLADES
35 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 682

AVG. FLOW COEFF. = 1.303
AVG. P-RISE COEFF. = 0.023
AVG. INCIDENCE = 2.29 DEG.

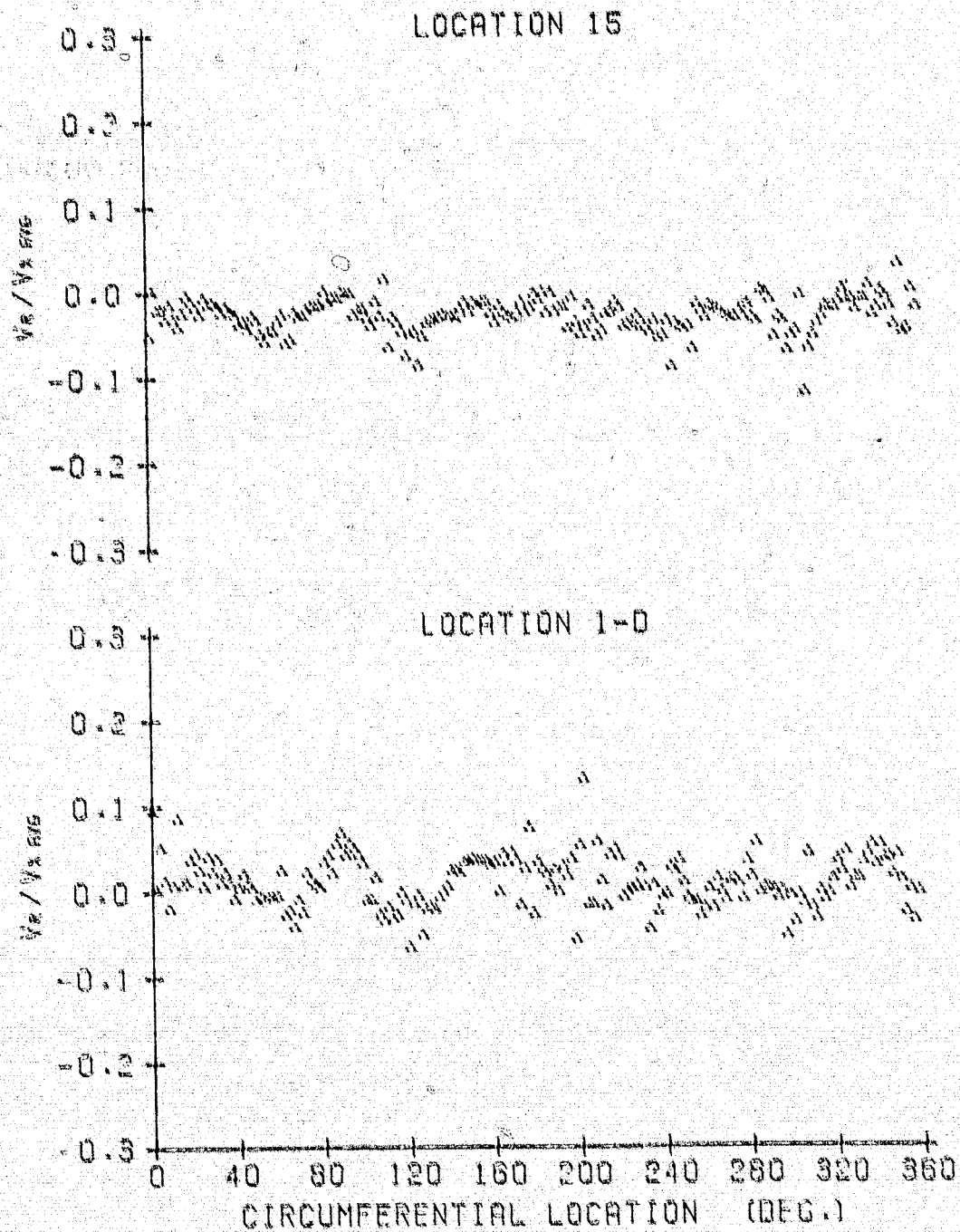


Figure D.3

10 October 1978
LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 682

AVG. FLOW COEFF. = 1.303
AVG. P-RISE COEF. = 0.023
AVG. INCIDENCE = 2.29 DEG.

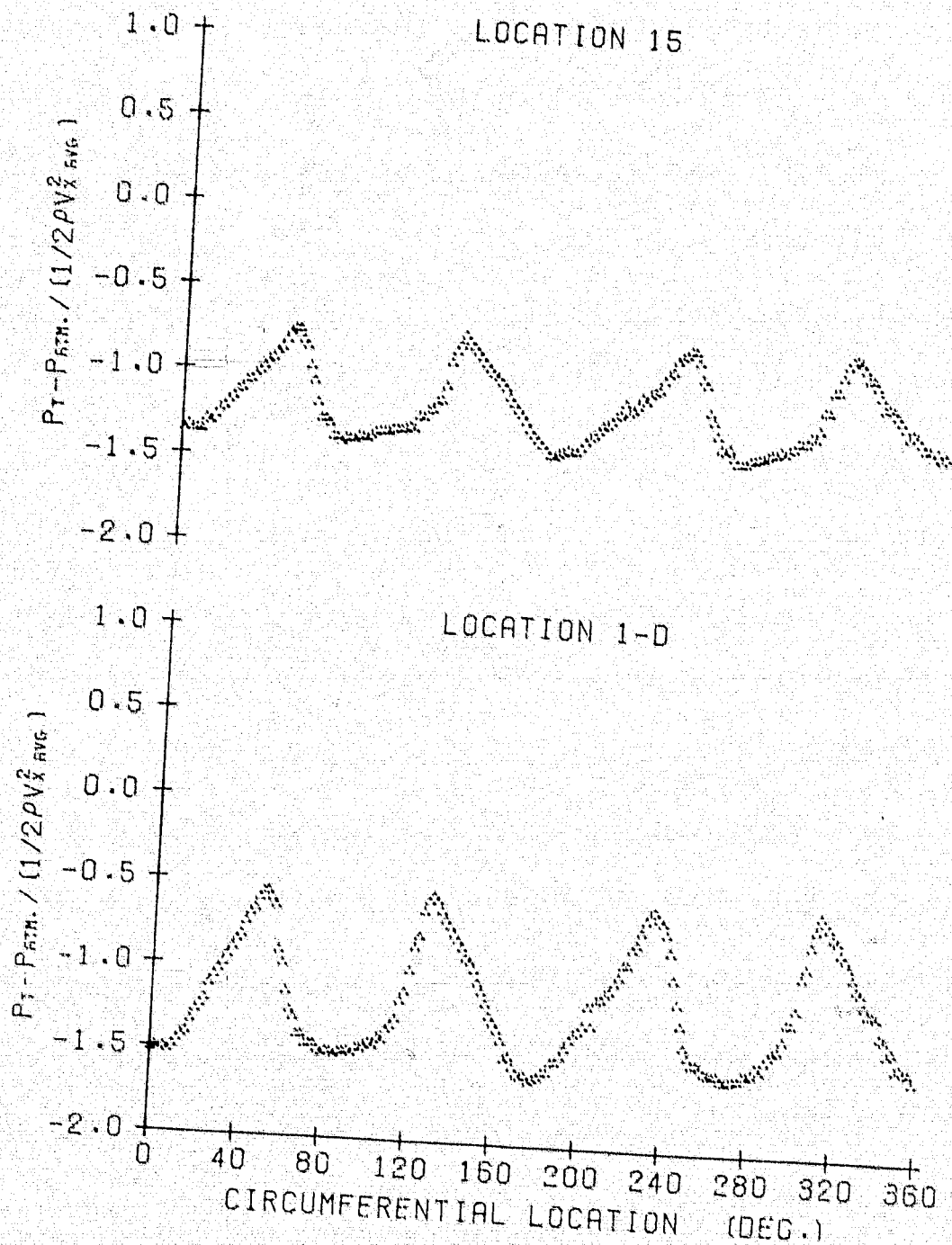


Figure D.4

10 October 1978
LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 682

AVG. FLOW COEFF. = 1.303
AVG. P-RISE COEFF. = 0.023
AVG. INCIDENCE = 2.29 DEG.

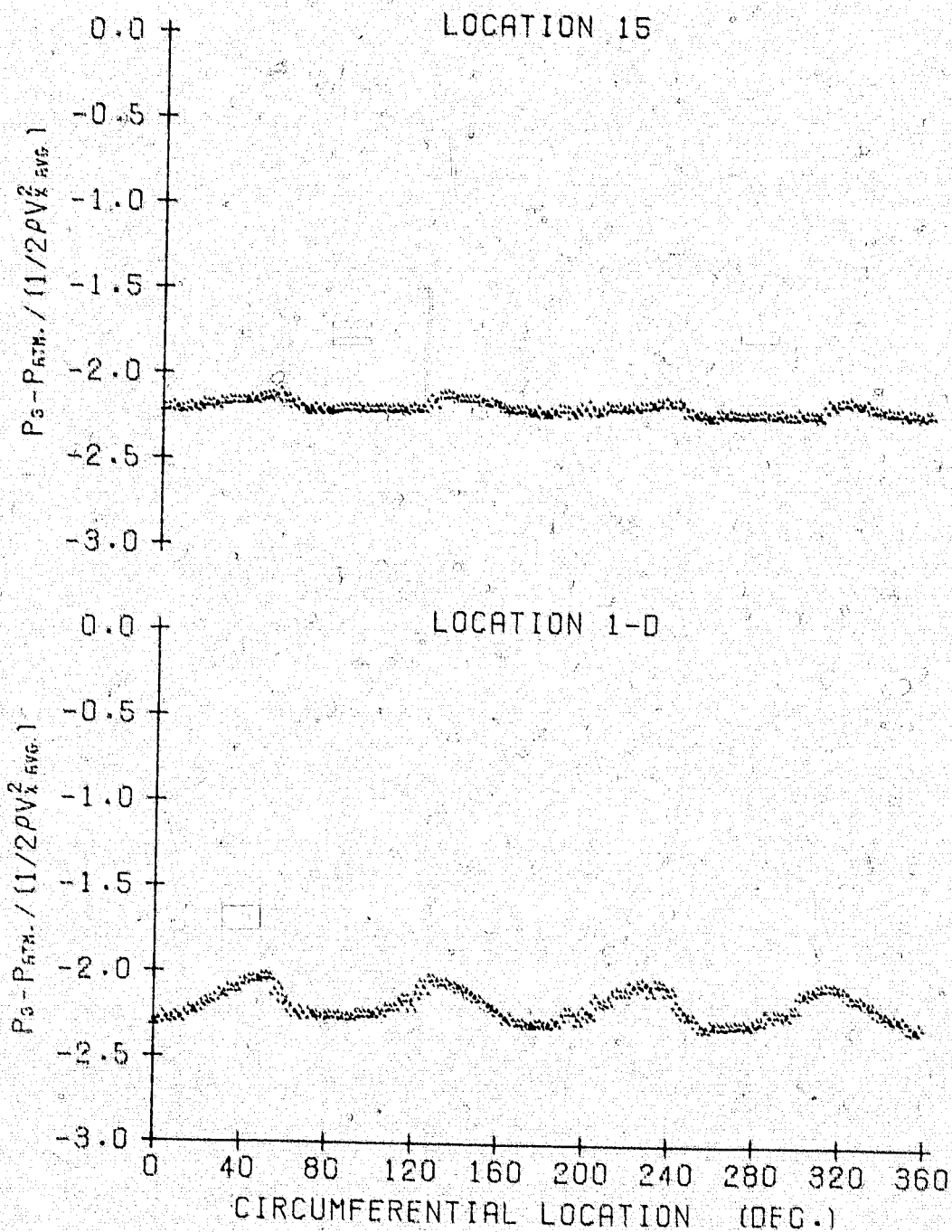


Figure D.5

10 October 1978
LCB:jep

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6 BLADES
35 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 682

AVG. FLOW COEF. = 1.303
AVG. P-RISE COEF. = 0.023
AVG. INCIDENCE = 2.29 DEG.

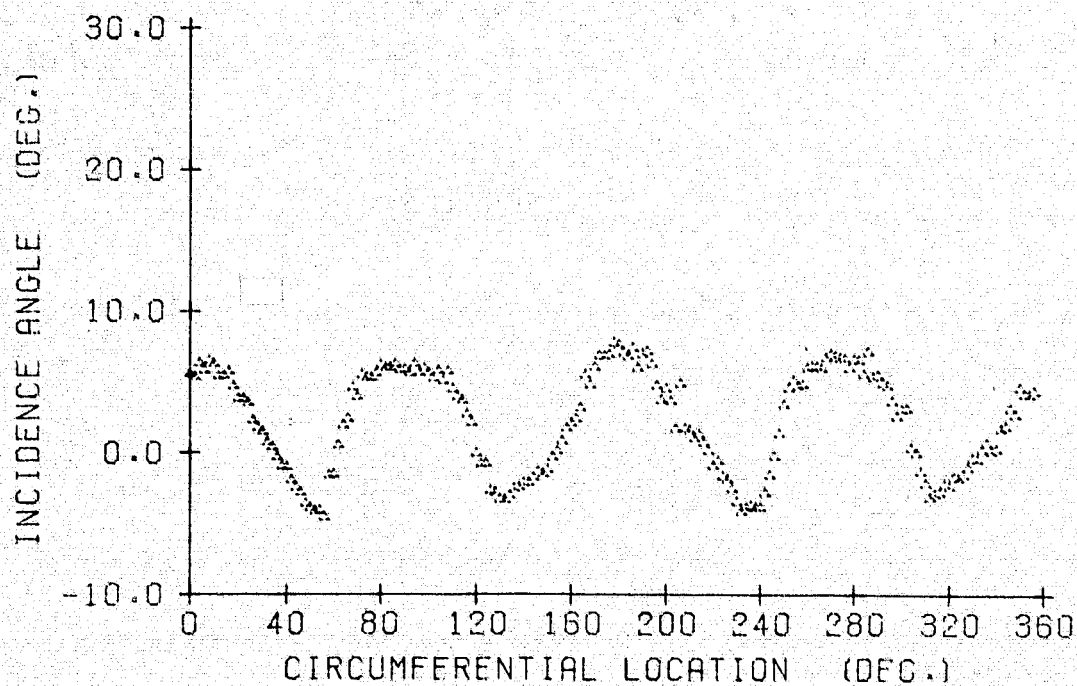


Figure D.6

10 October 1978

LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 941

AVG. FLOW COEF. = 0.992
AVG. P-RISE COEF. = 0.454
AVG. INCIDENCE = 10.12 DEG.

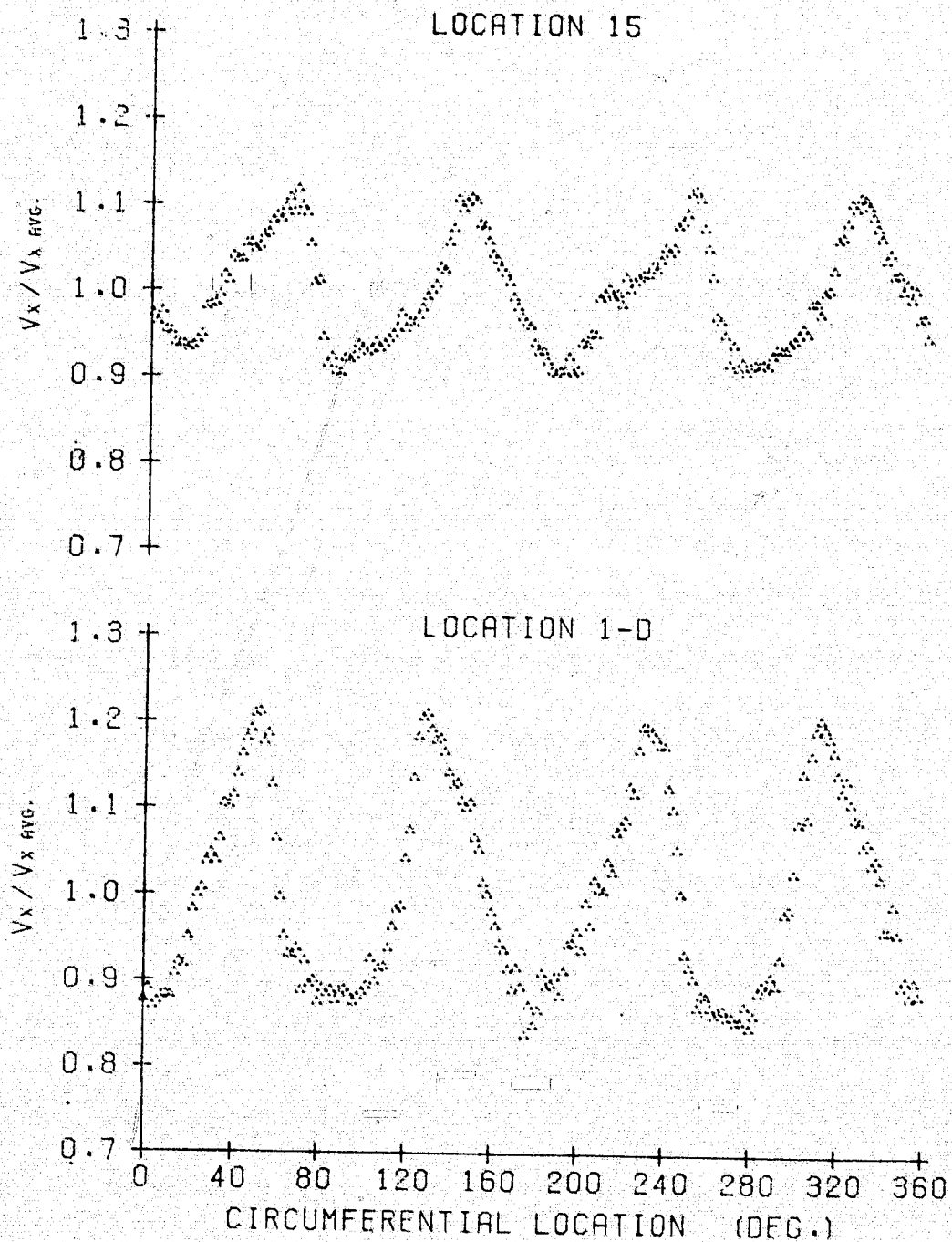


Figure D.7

10 October 1978
LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 941

AVG. FLOW COEF. = 0.992
AVG. P-RISE COEF. = 0.454
AVG. INCIDENCE = 10.12 DEG.

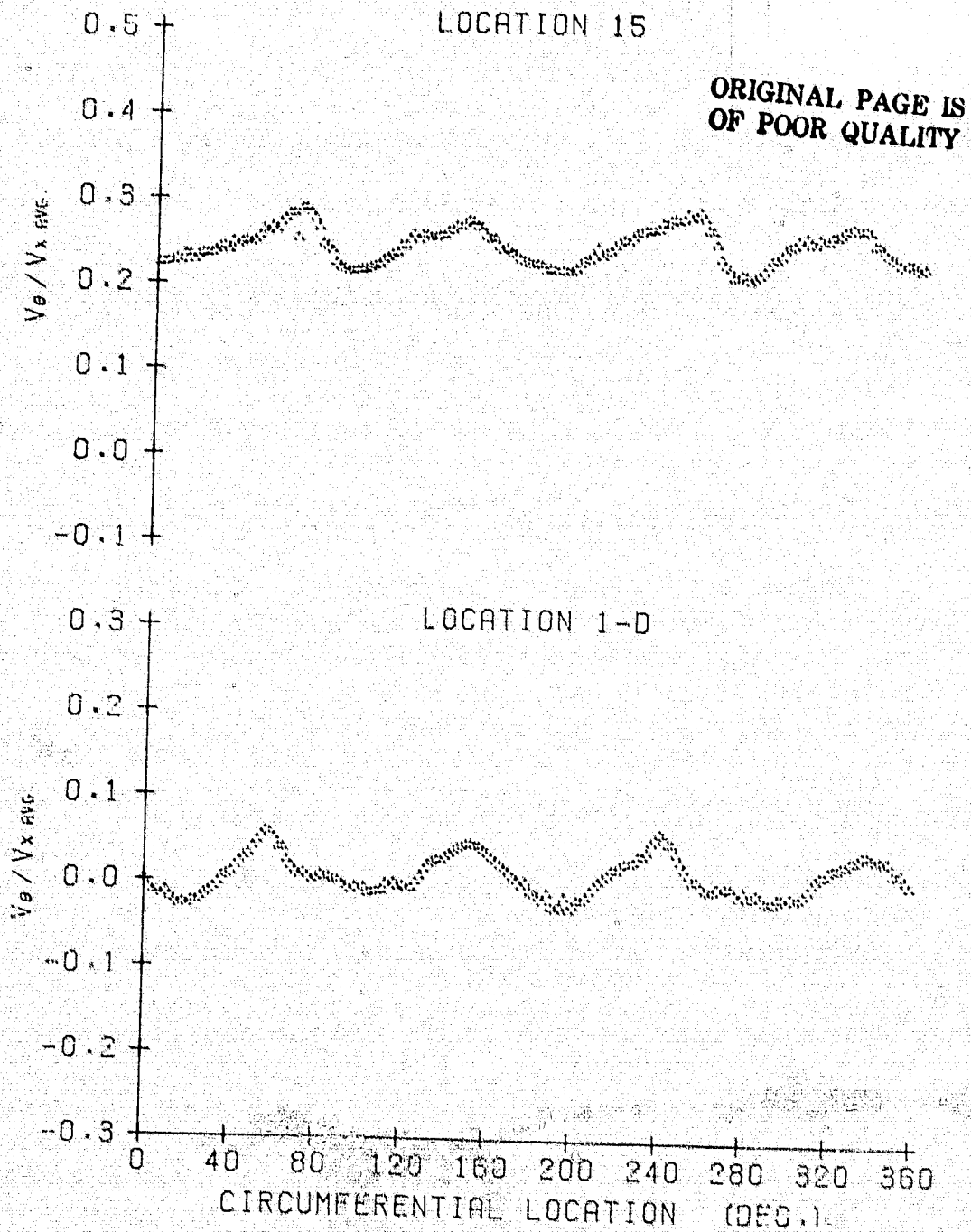


Figure D.8

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10 October 1978
LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 941

AVG. FLOW COEF. = 0.992
AVG. P-RISE COEF. = 0.454
AVG. INCIDENCE = 10.12 DEG.

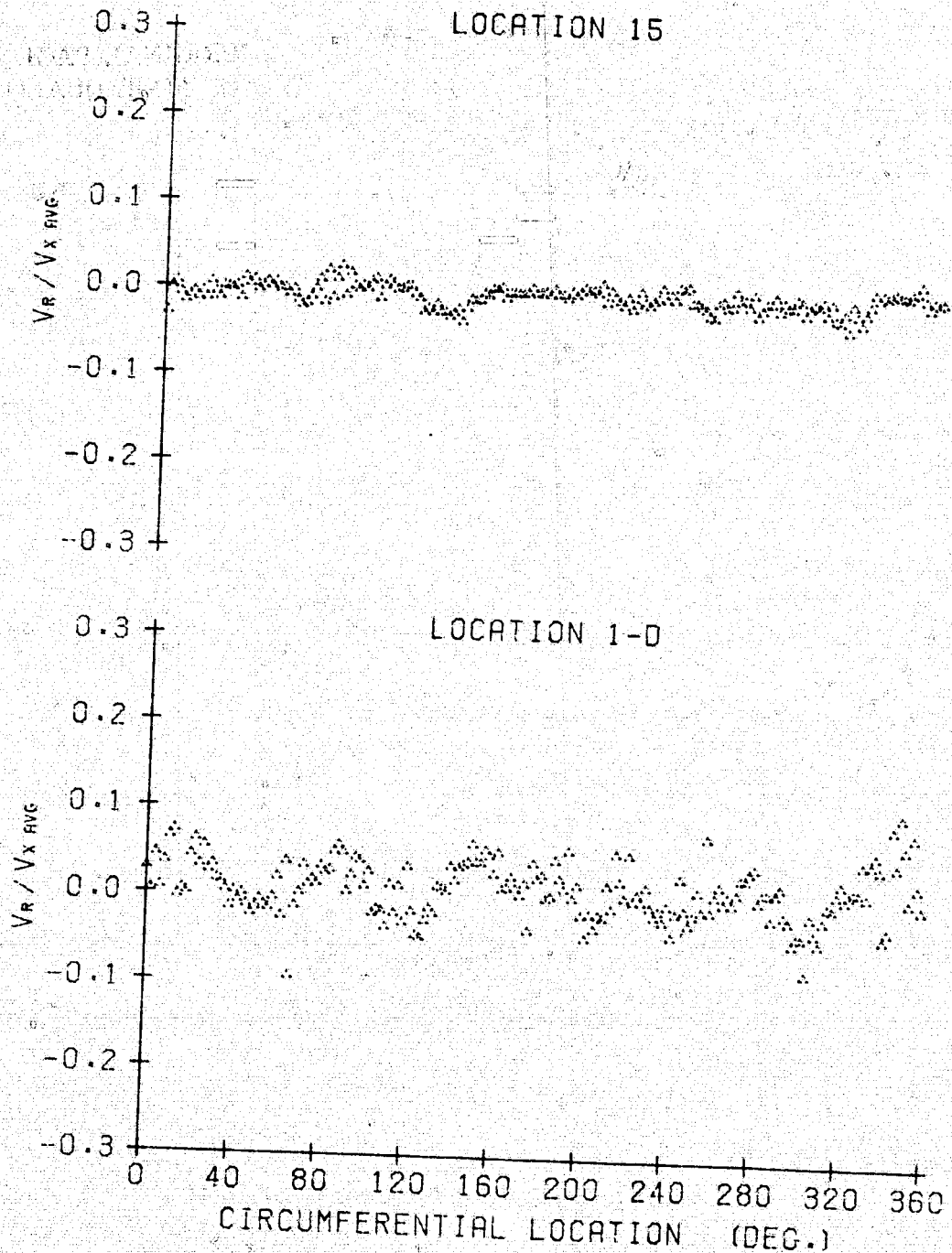


Figure D.9

10 October 1978
LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 941

AVG. FLOW COEF. = 0.992
AVG. P-RISE COEF. = 0.454
AVG. INCIDENCE = 10.12 DEG.

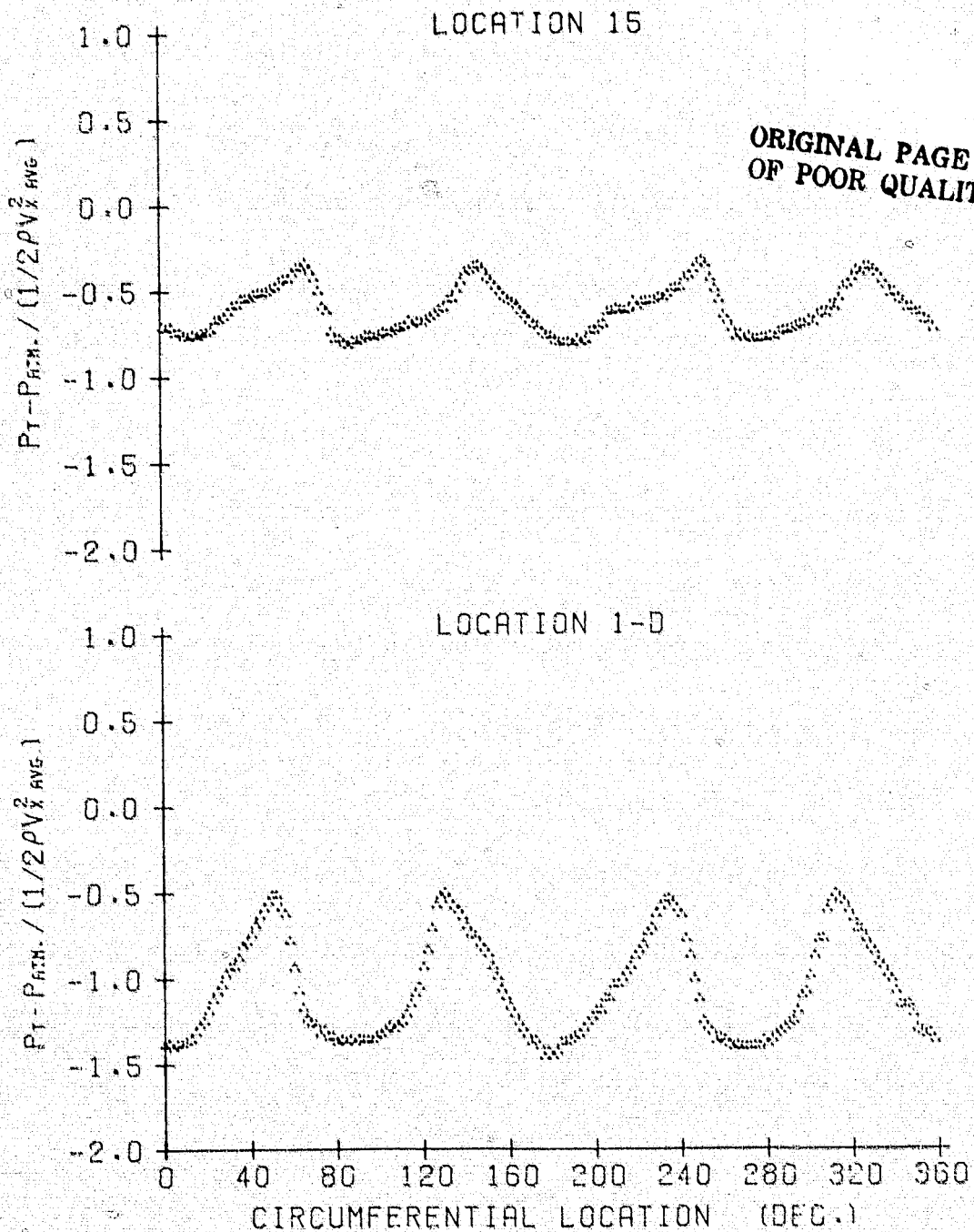


Figure D.10

10 October 1978

LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 941

AVG. FLOW COEF. = 0.992
AVG. P-RISE COEF. = 0.454
AVG. INCIDENCE = 10.12 DEG.

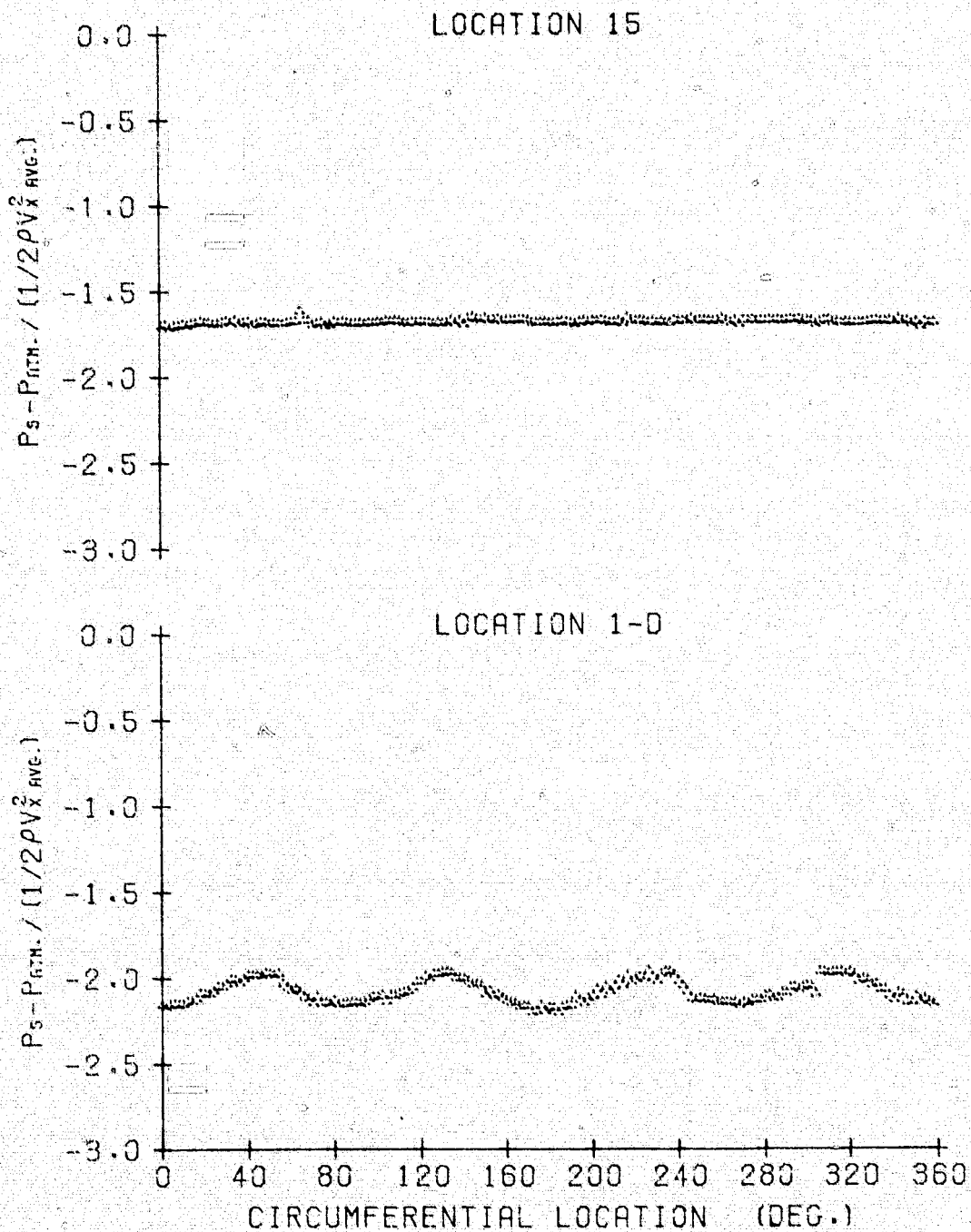


Figure D.11

10 October 1978
LCB:jep

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6 BLADES
35 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 941

AVG. FLOW COEF. = 0.992
AVG. P-RISE COEF. = 0.454
AVG. INCIDENCE = 10.12 DEG.

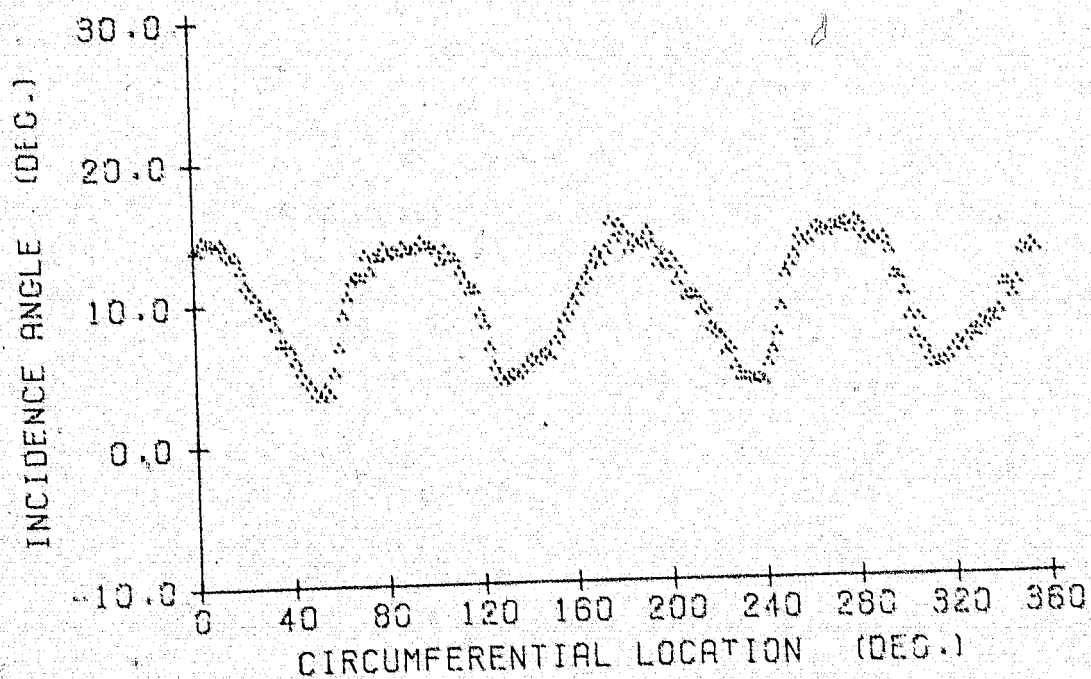


Figure D.12

10 October 1978
LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1203

AVG. FLOW COEF. = 0.802
AVG. P-RISE COEF. = 1.004
AVG. INCIDENCE = 16.24 DEG.

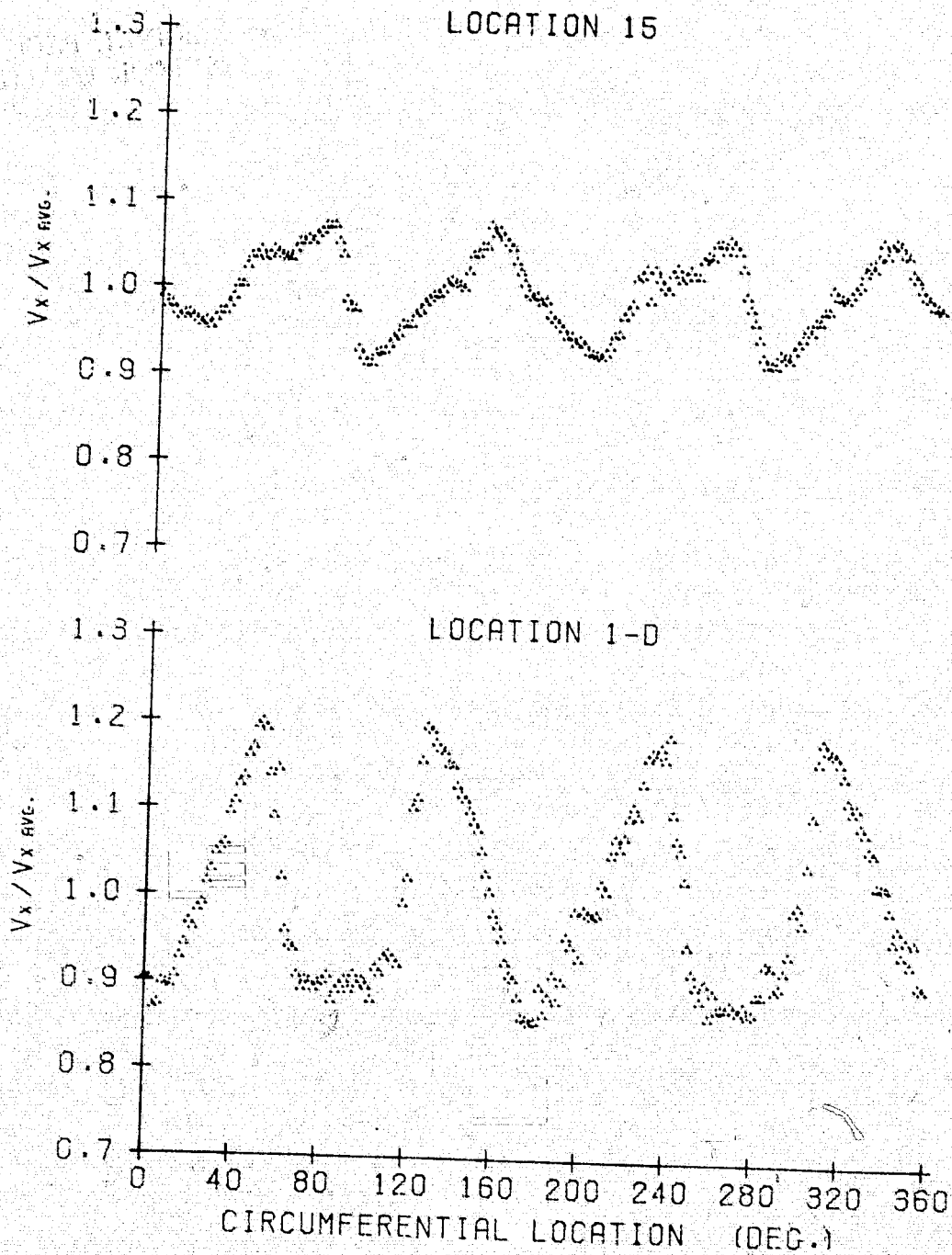


Figure D.13

10 October 1978
LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1203

AVG. FLOW COEF. = 0.802
AVG. P-RISE COEF. = 1.004
AVG. INCIDENCE = 16.24 DEG.

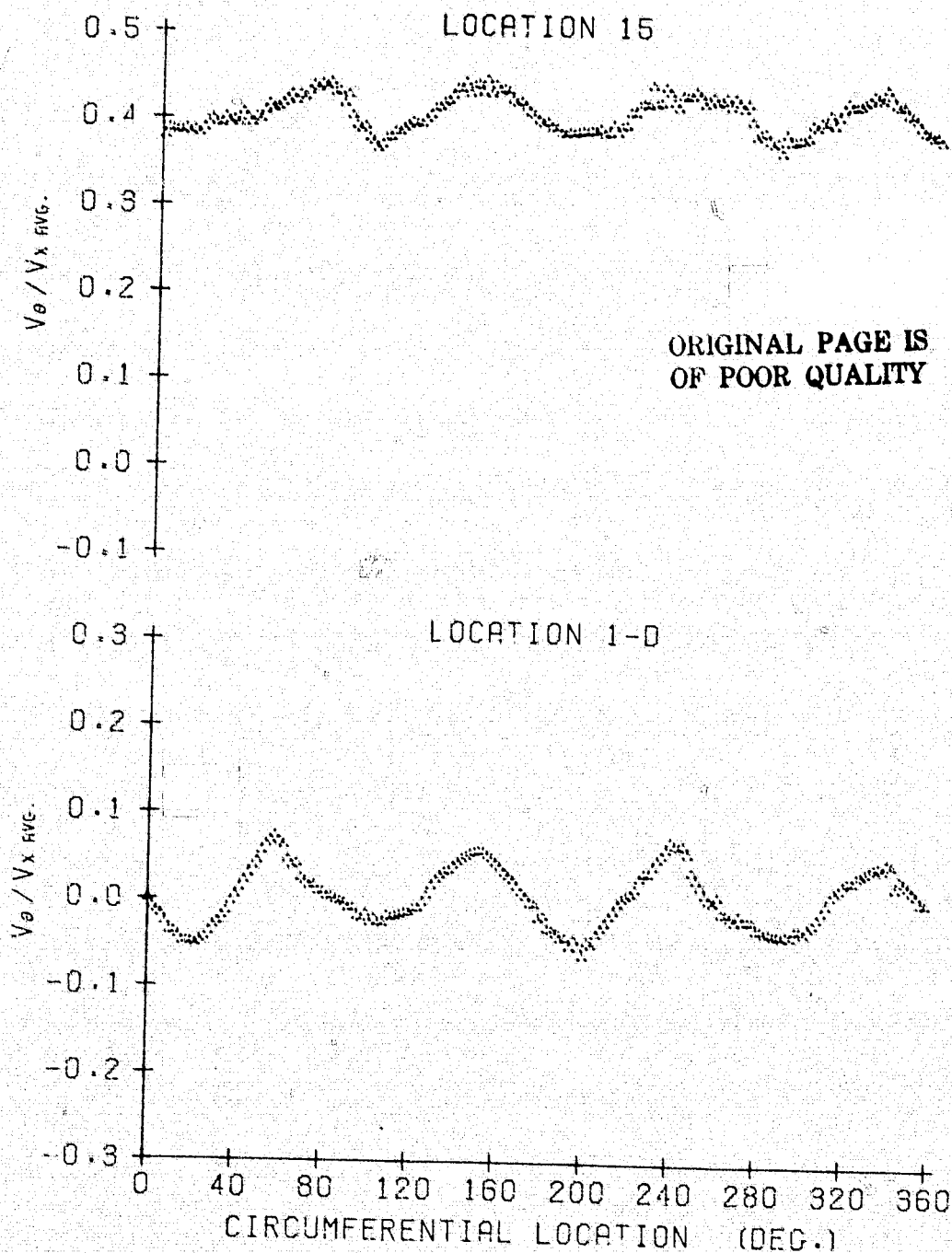


Figure D.14

10 October 1978
LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1203

AVG. FLOW COEF. = 0.802
AVG. P-RISE COEF. = 1.004
AVG. INCIDENCE = 16.24 DEG.

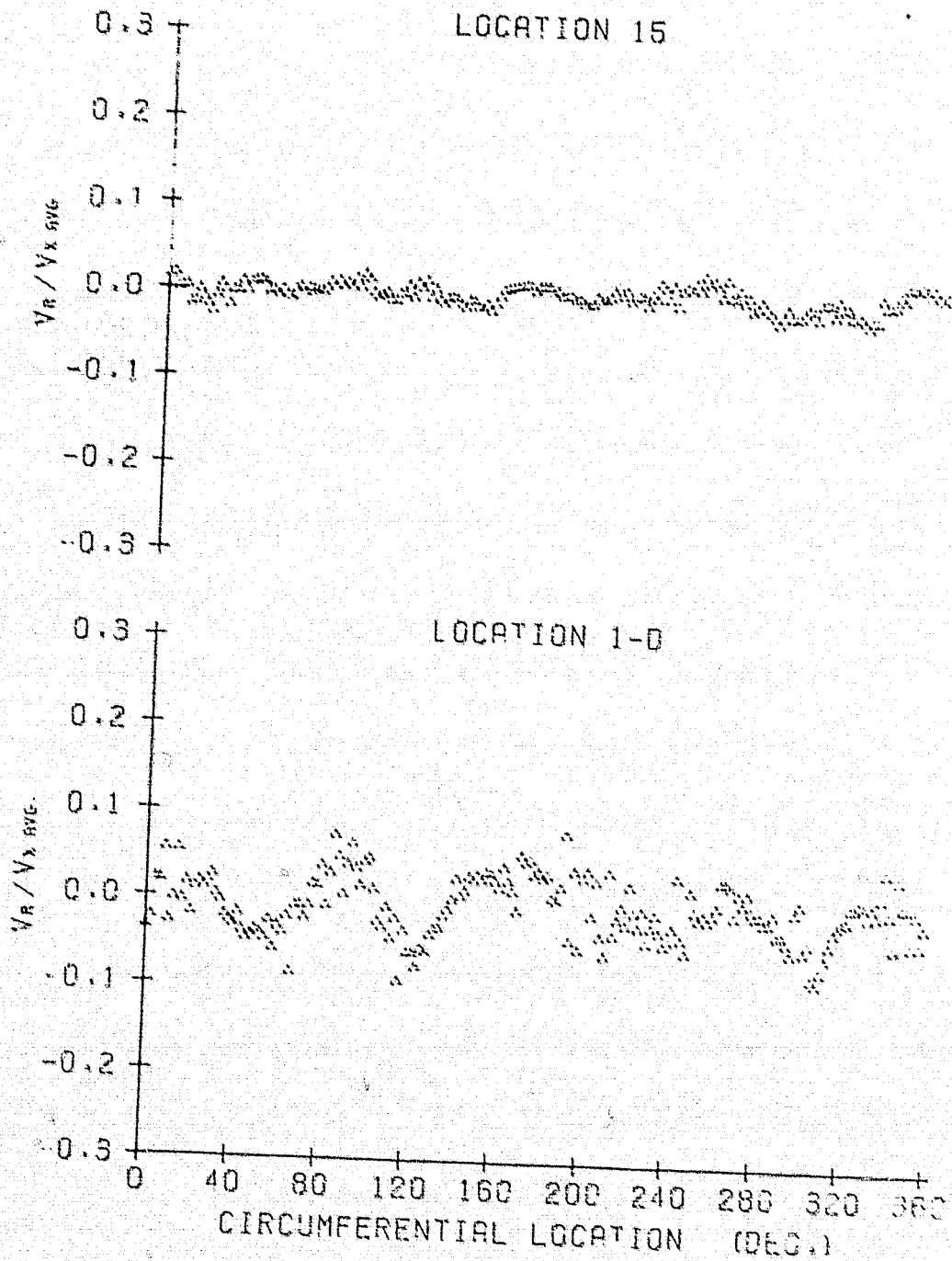


Figure D.15

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10 October 1978

LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1203

AVG. FLOW COEF. = 0.802
AVG. P-RISE COEF. = 1.004
AVG. INCIDENCE = 16.24 DEG.

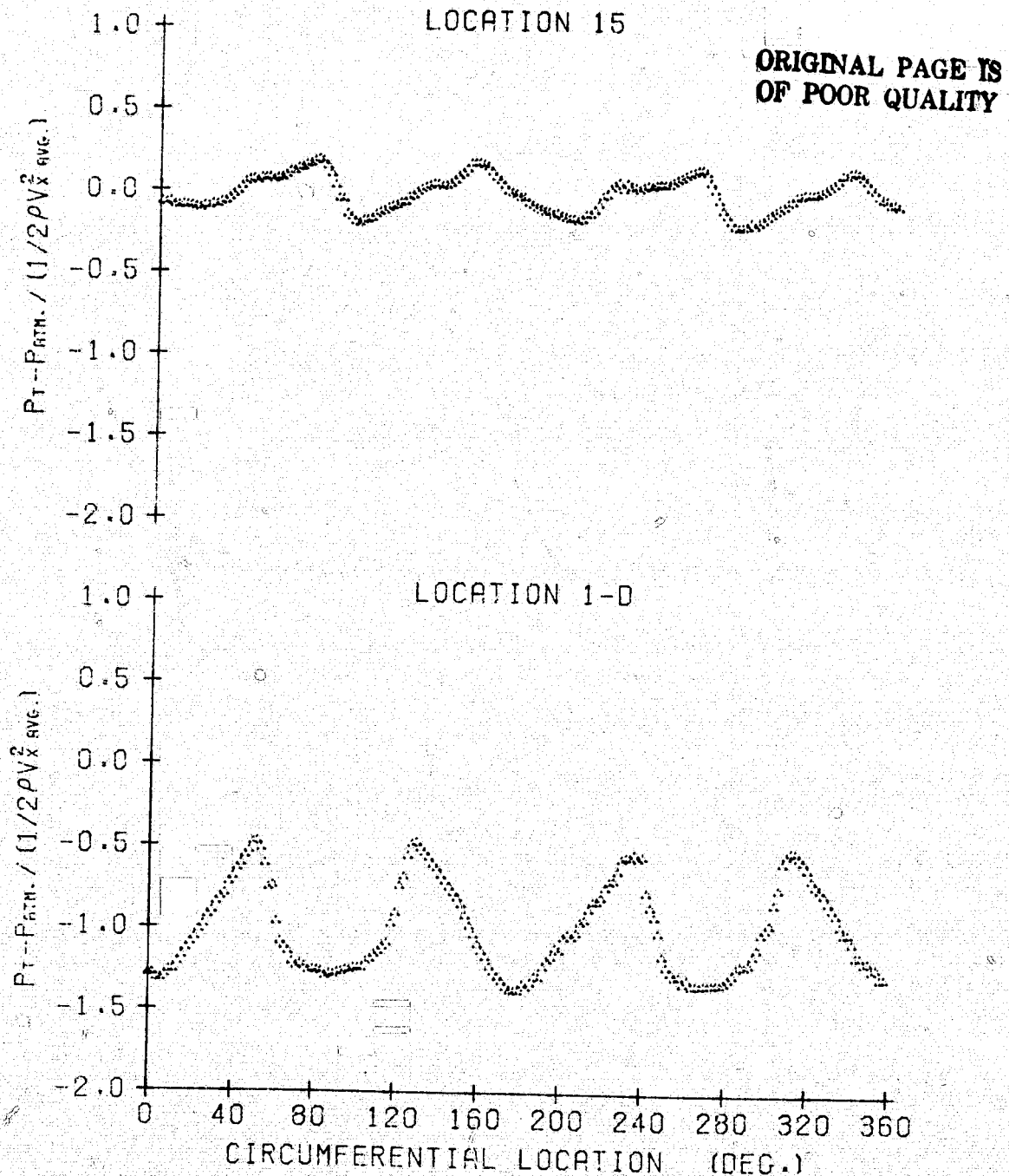


Figure D.16

10 October 1978
LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1203

AVG. FLOW COEF. = 0.802
AVG. P-RISE COEF. = 1.004
AVG. INCIDENCE = 16.24 DEG.

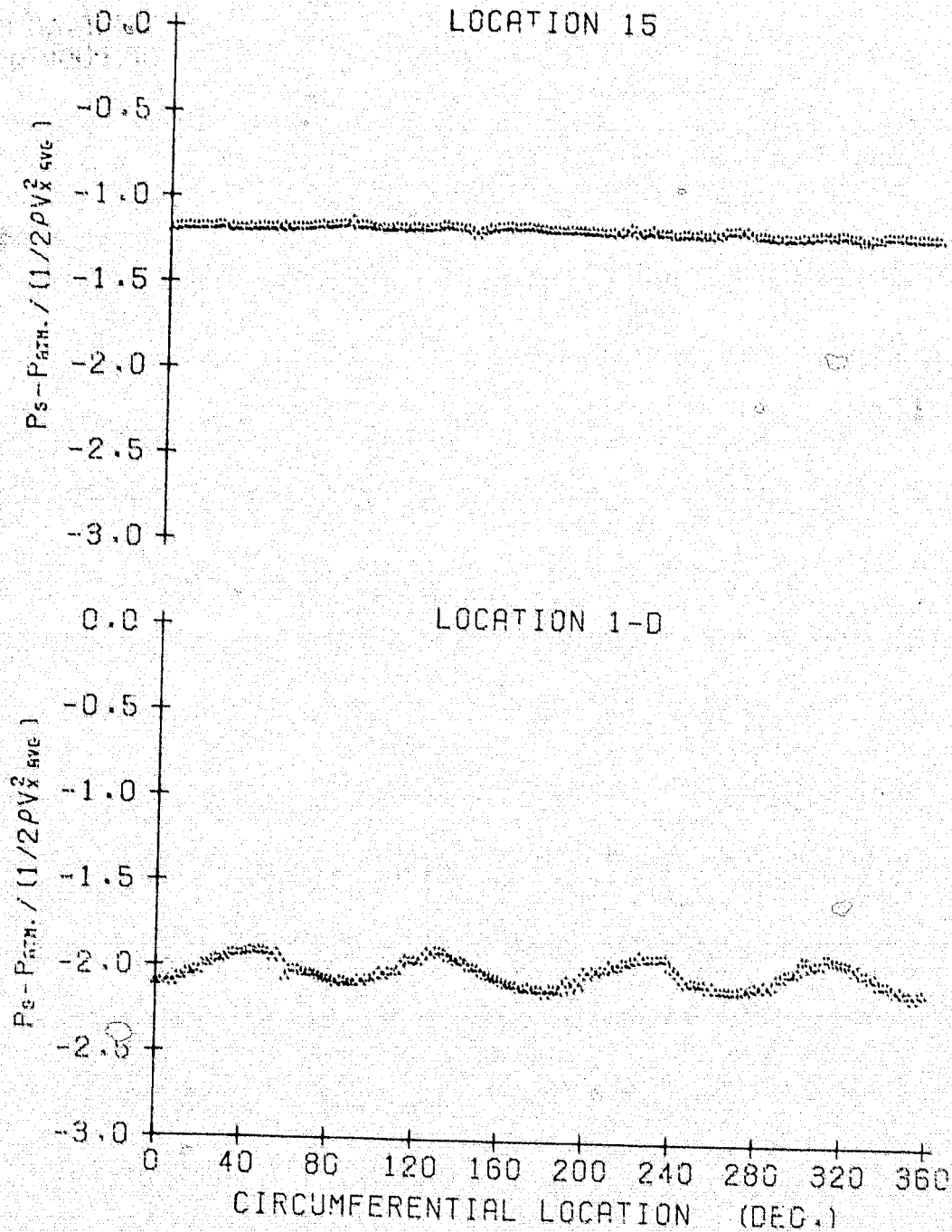


Figure D.17

10 October 1978
LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1203

AVG. FLOW COEF. = 0.802
AVG. P-RISE COEF. = 1.004
AVG. INCIDENCE = 16.24 DEG.

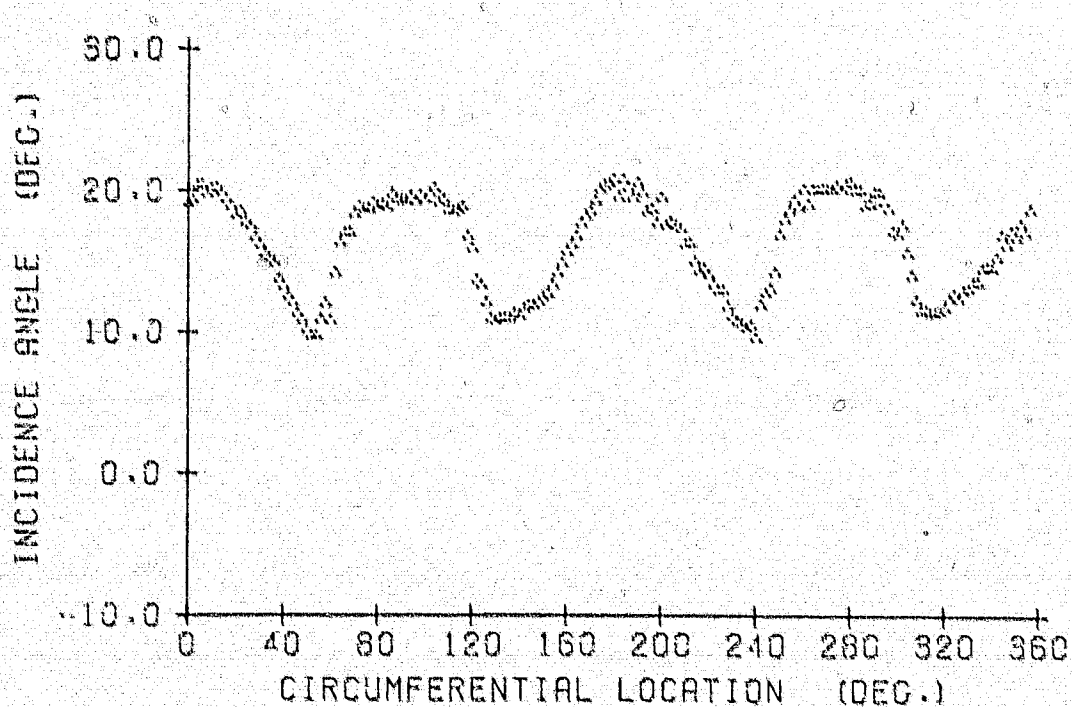


Figure D.18

10 October 1978
LCB:jep

6 BLADES
45 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 975

AVG. FLOW COEF. = 0.985
AVG. P-RISE COEF. = 0.014
AVG. INCIDENCE = 0.40 DEG.

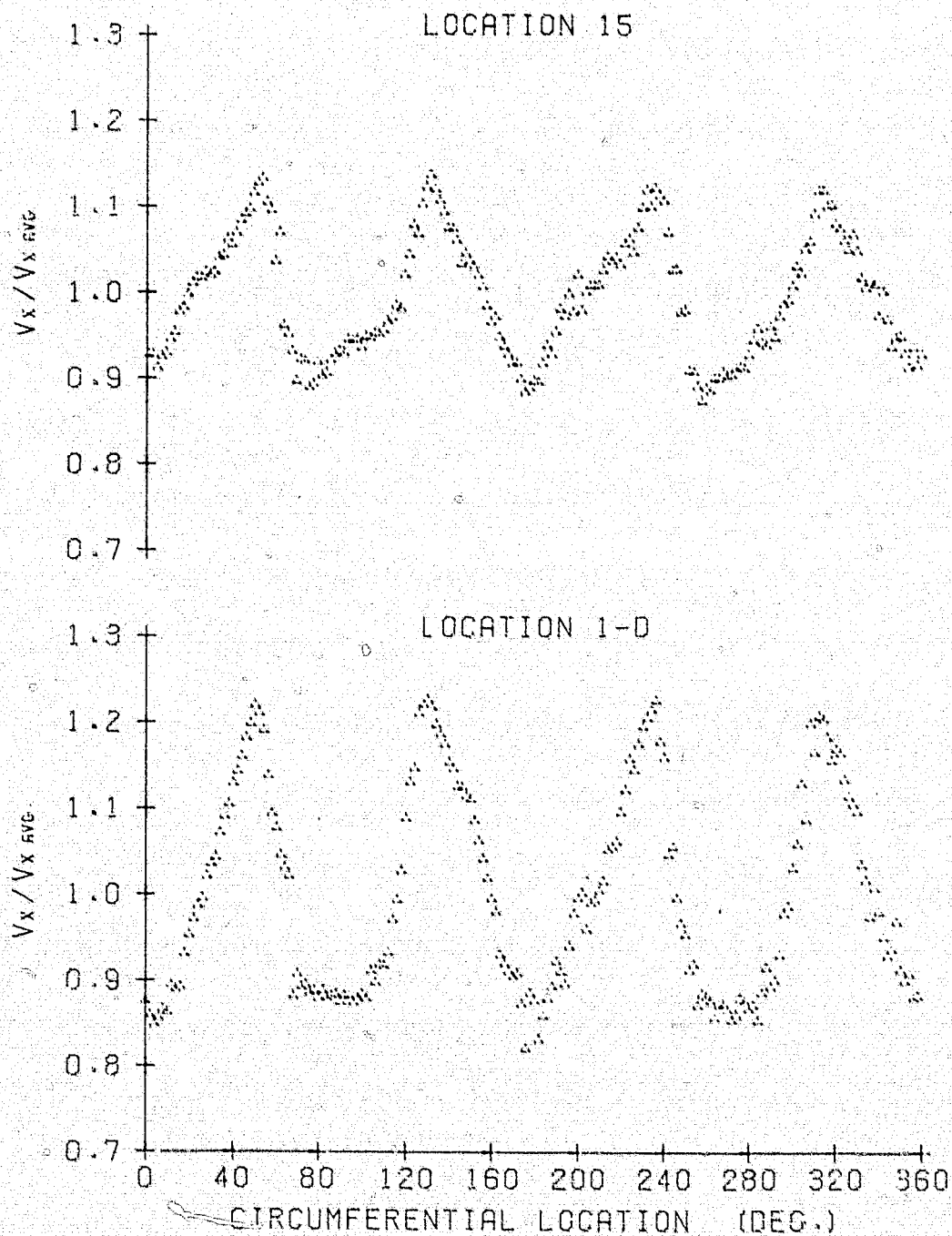


Figure D.19

10 October 1978

LGB:jep

6 BLADES
45 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 975

AVG. FLOW COEF. = 0.985
AVG. P-RISE COEF. = 0.014
AVG. INCIDENCE = 0.40 DEG.

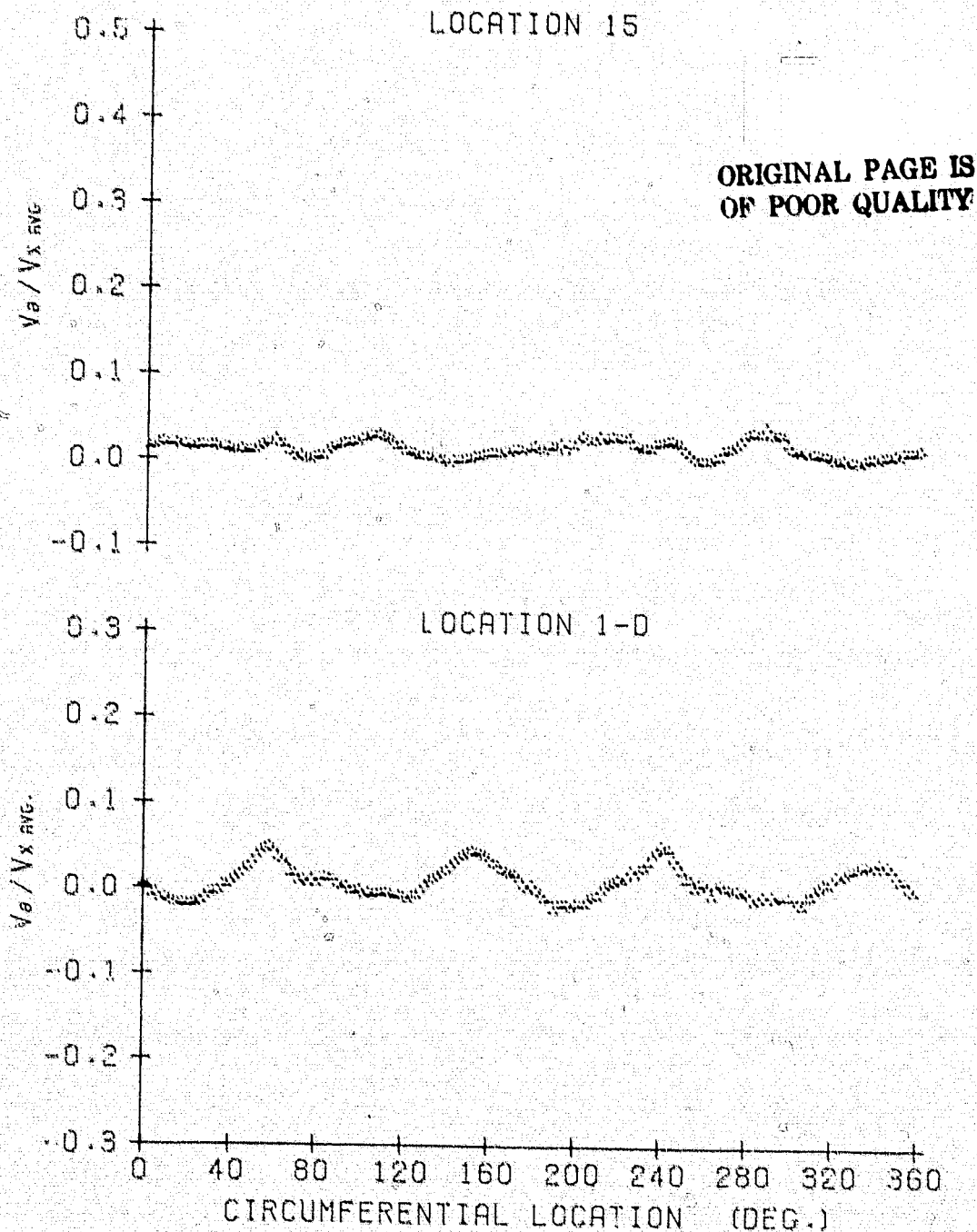


Figure D.20

10 October 1978
LCB:jep

6 BLADES
45 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 975

AVG. FLOW COEF. = 0.985
AVG. P-RISE COEF. = 0.014
AVG. INCIDENCE = 0.40 DEG.

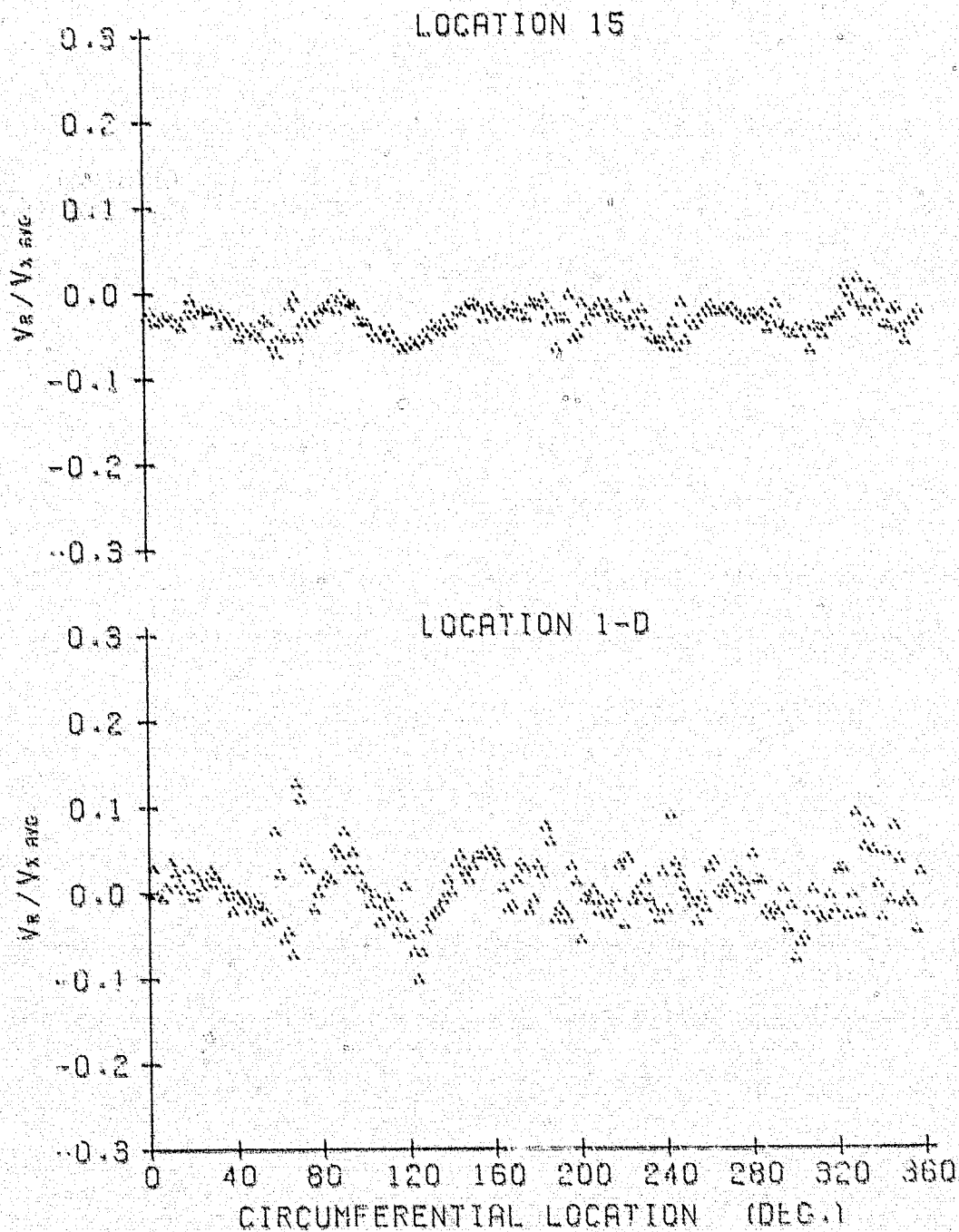


Figure D.21

10 October 1978

LCB:jep

6 BLADES
45 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 975

AVG. FLOW COEF. = 0.985
AVG. P-RISE COEF. = 0.014
AVG. INCIDENCE = 0.40 DEG.

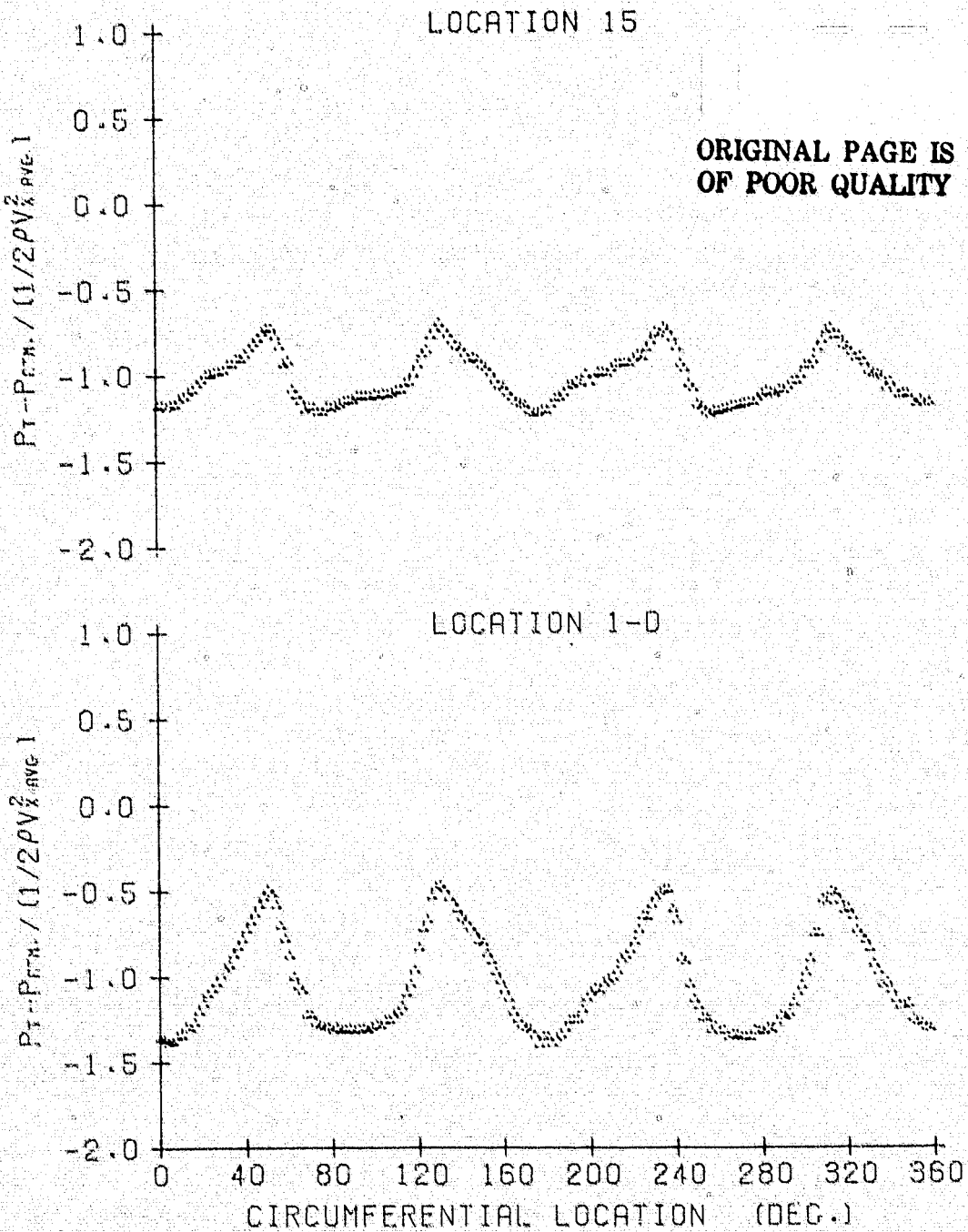


Figure D.22

10 October 1978

LCB:jep

6 BLADES
45 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 975

AVG. FLOW COEFF. = 0.985
AVG. P-RISE COEFF. = 0.014
AVG. INCIDENCE = 0.40 DEG.

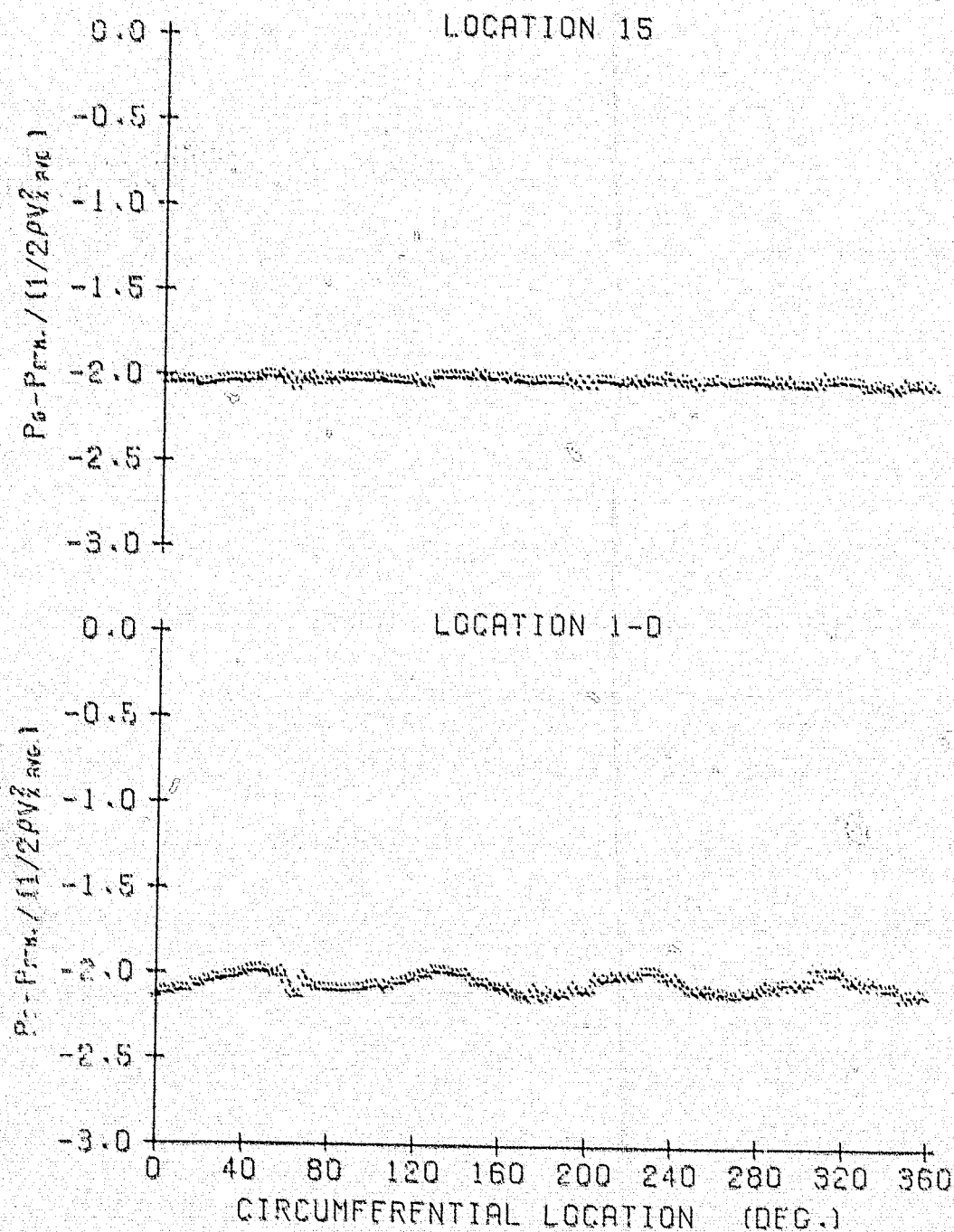


Figure D.23

10 October 1978
LCB:jep

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6 BLADES
45 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 975

AVG. FLOW COEF. = 0.985
AVG. P-RISE COEF. = 0.014
AVG. INCIDENCE = 0.40 DEG.

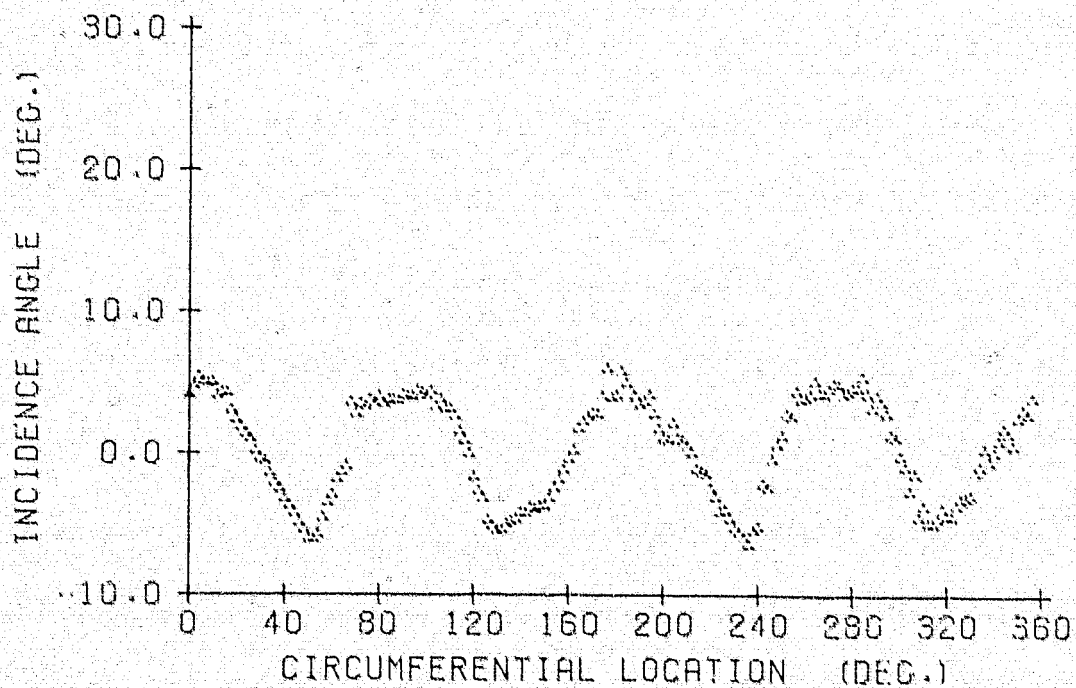


Figure D.24

10 October 1978
LCB:jep

6 BLADES
45 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1293

AVG. FLOW COEF. = 0.739
AVG. P-RISE COEF. = 0.660
AVG. INCIDENCE = 8.50 DEG.

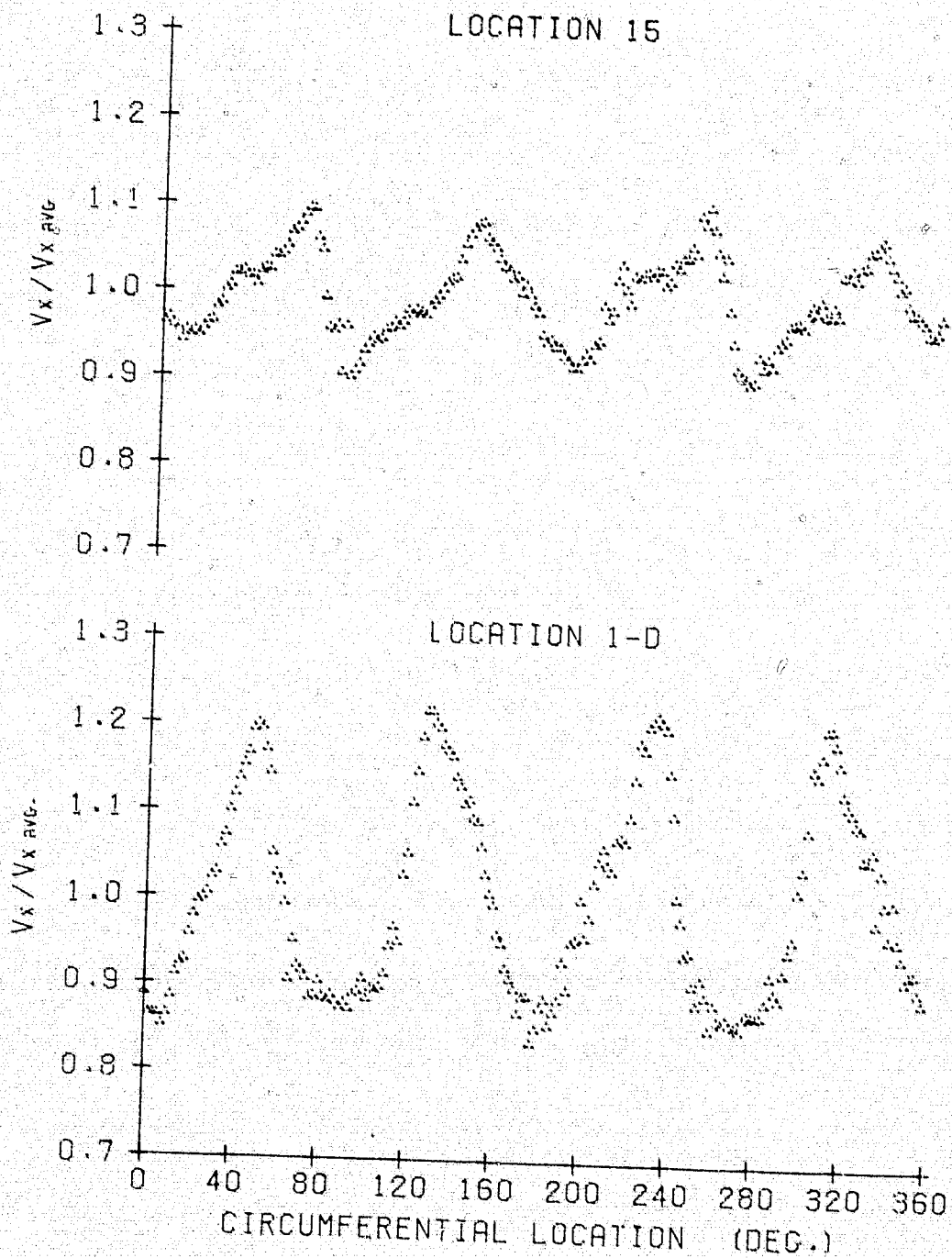


Figure D.25

10 October 1978
LCB:jep

6 BLADES
45 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1293

AVG. FLOW COEF. = 0.739
AVG. P-RISE COEF. = 0.660
AVG. INCIDENCE = 8.50 DEG.

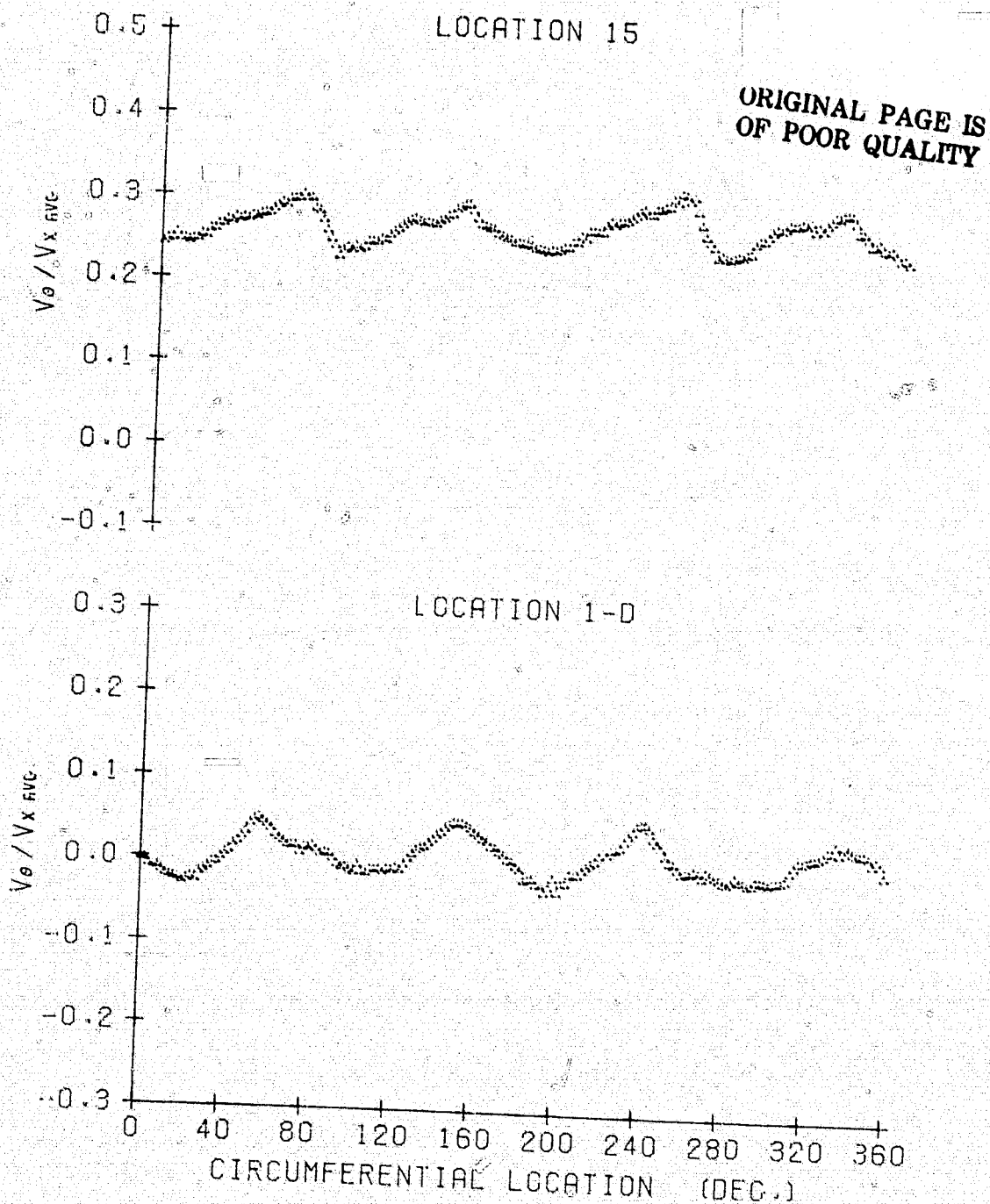


Figure D.26

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10 October 1978
LCB:jep

6 BLADES
45 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1293

AVG. FLOW COEF. = 0.739
AVG. P-RISE COEF. = 0.660
AVG. INCIDENCE = 8.50 DEG.

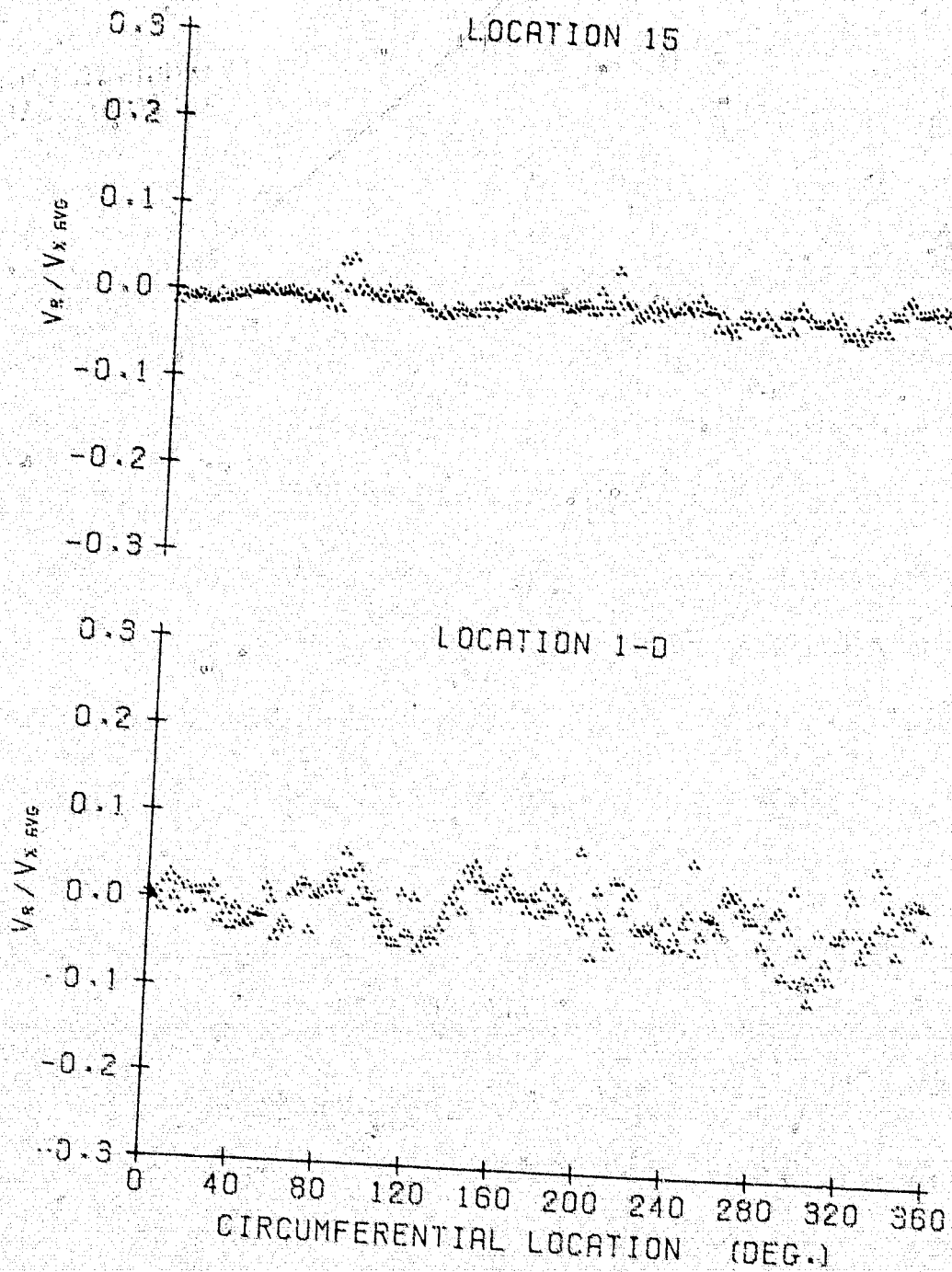


Figure D.27

10 October 1978
LCB:jep

6 BLADES
45 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1293

AVG. FLOW COEF. = 0.739
AVG. P-RISE COEF. = 0.660
AVG. INCIDENCE = 8.50 DEG.

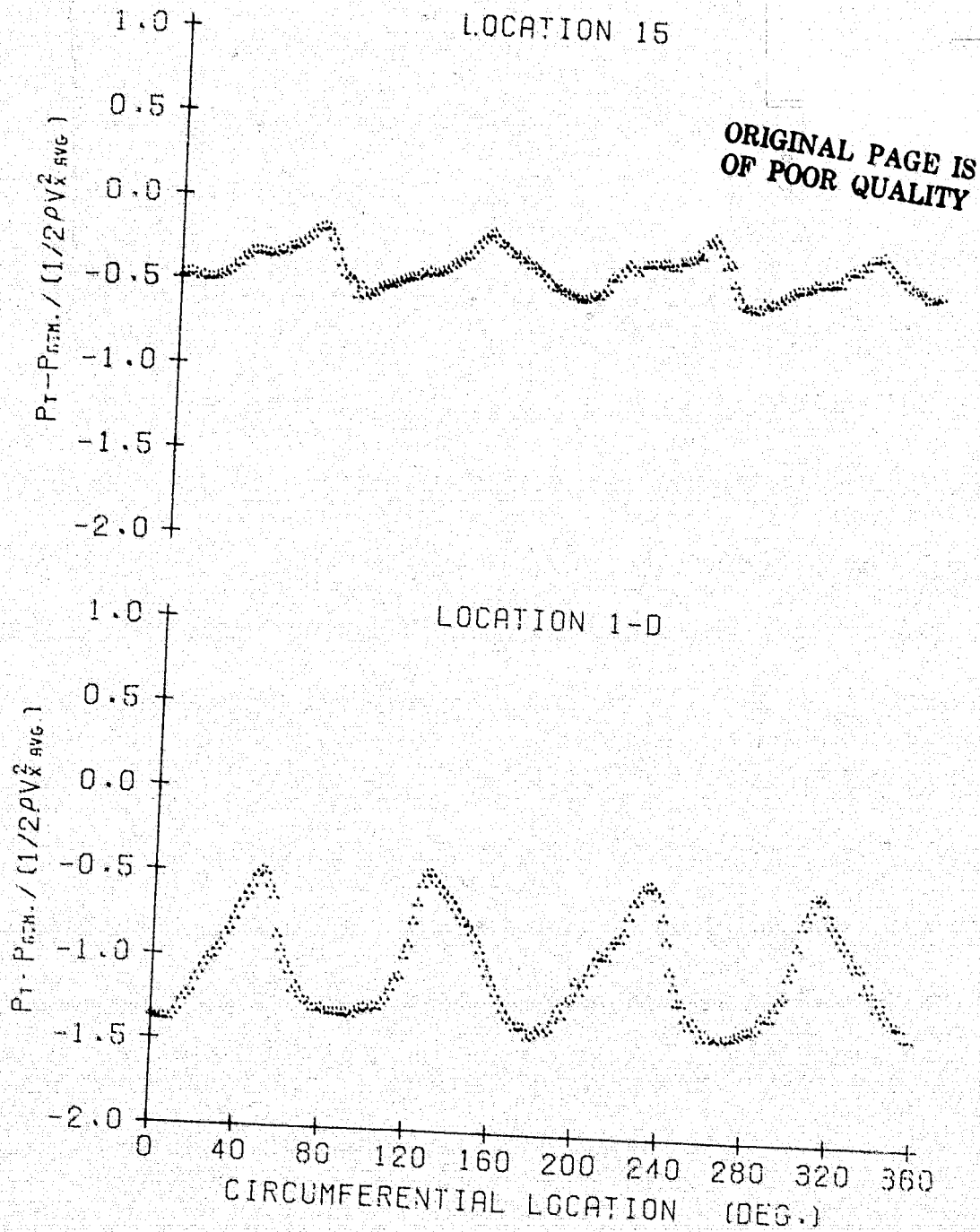


Figure D.28

10 October 1978
LCB:jep

6 BLADES
45 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1293

AVG. FLOW COEF. = 0.739
AVG. P-RISE COEF. = 0.660
AVG. INCIDENCE = 8.50 DEG.

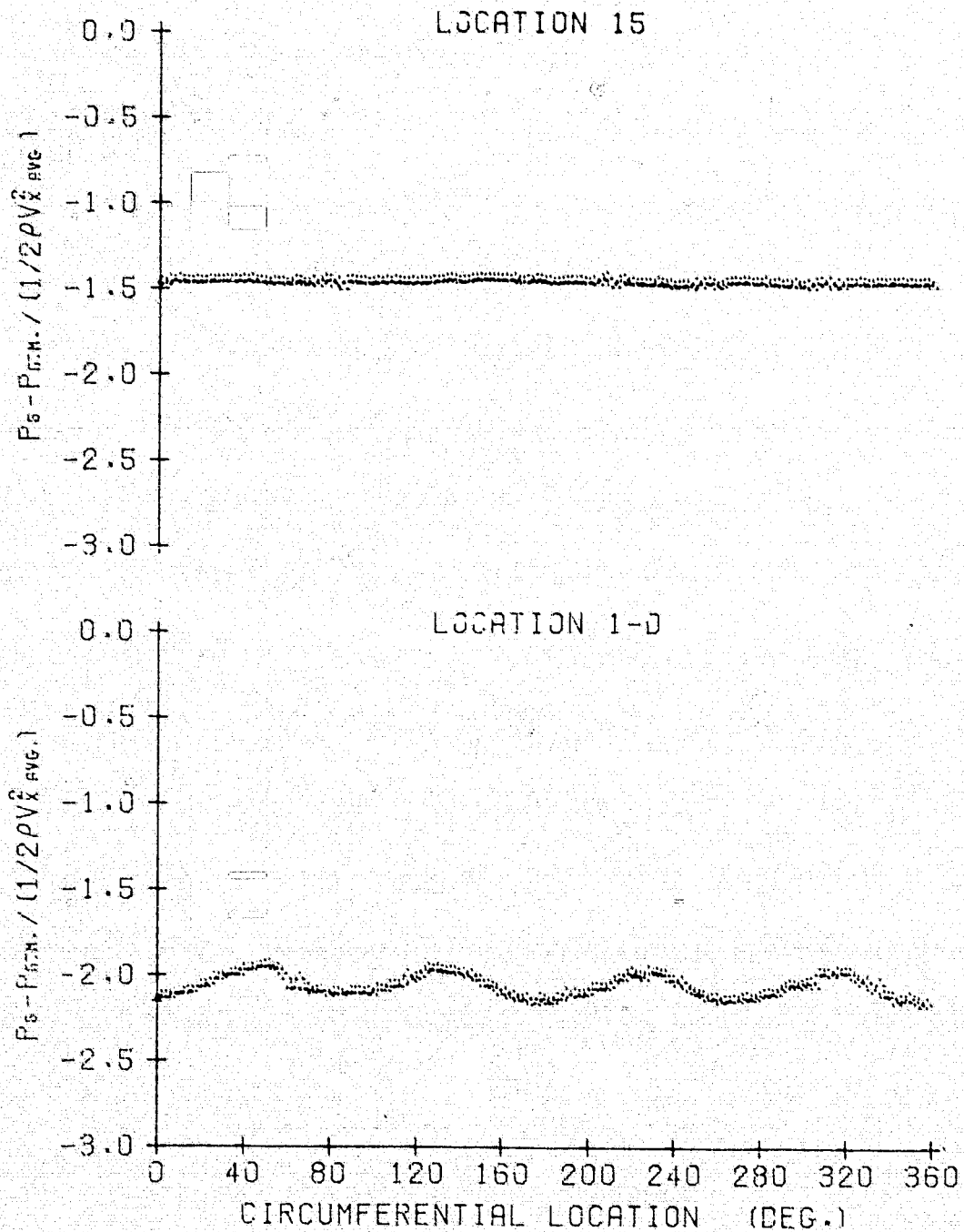


Figure D.29

10 October 1978
LCB:jep

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6 BLADES
45 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1293

AVG. FLOW COEF. = 0.739
AVG. P-RISE COEF. = 0.660
AVG. INCIDENCE = 8.50 DEG.

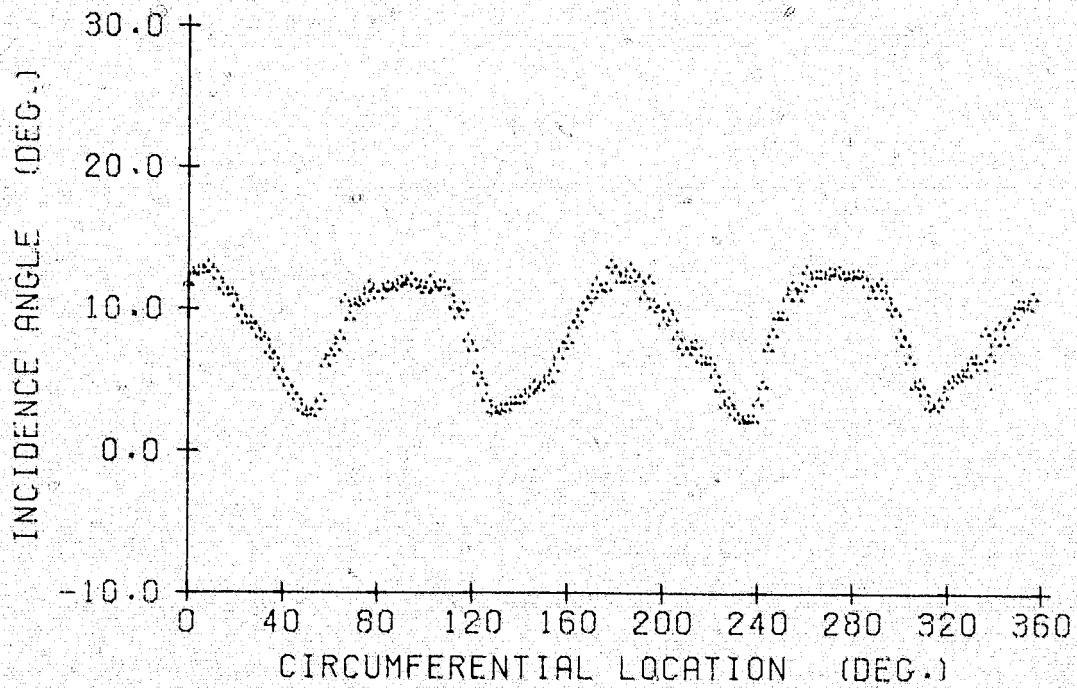


Figure D.30

10 October 1978

LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM 1392

AVG. FLOW COEF. = 0.675
AVG. P-RISE COEF. = 0.093
AVG. INCIDENCE = 0.57 DEG.

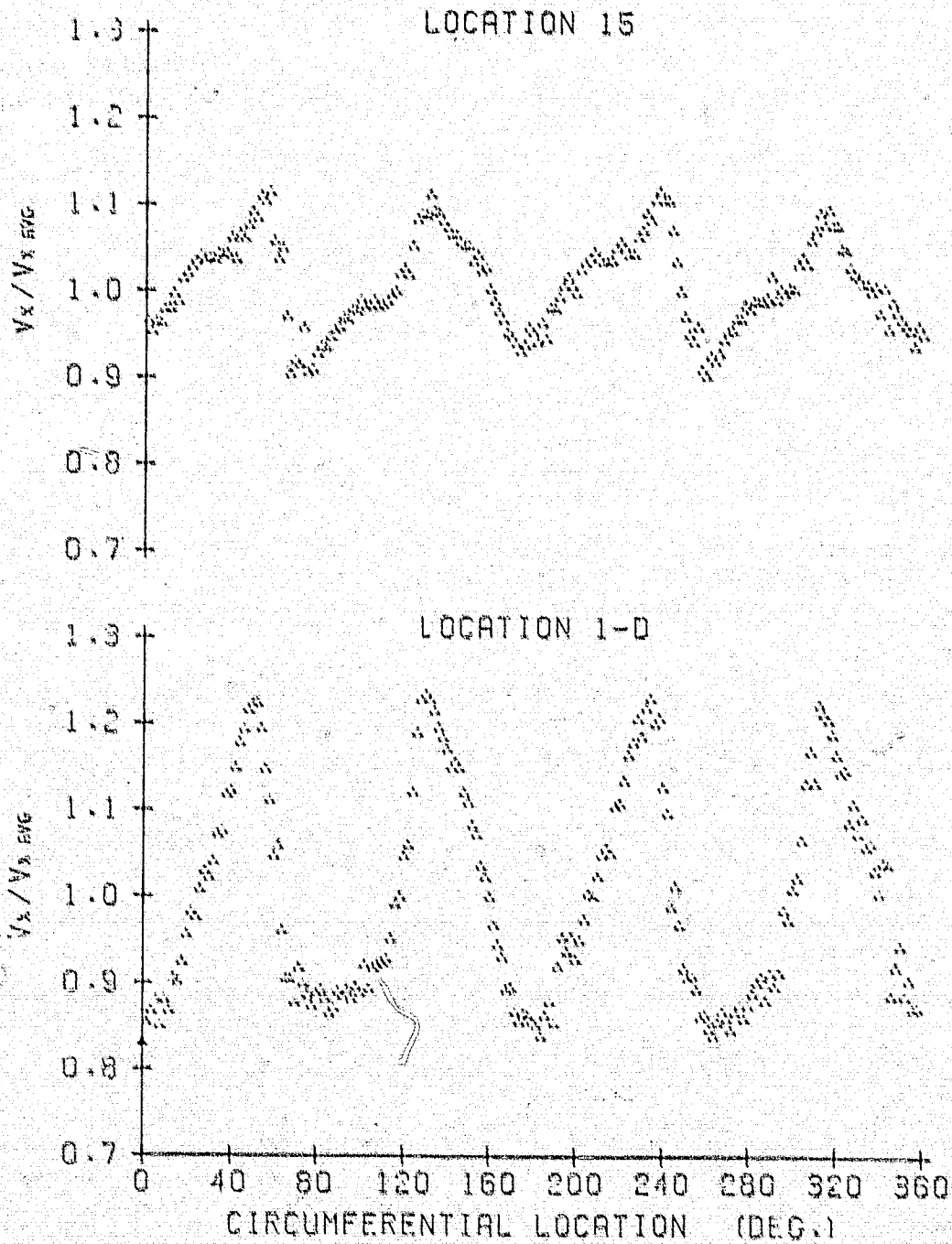


Figure D.31

10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1392

AVG. FLOW COEFF. = 0.675
AVG. P-RISE COEFF. = 0.093
AVG. INCIDENCE = 0.57 DEG.

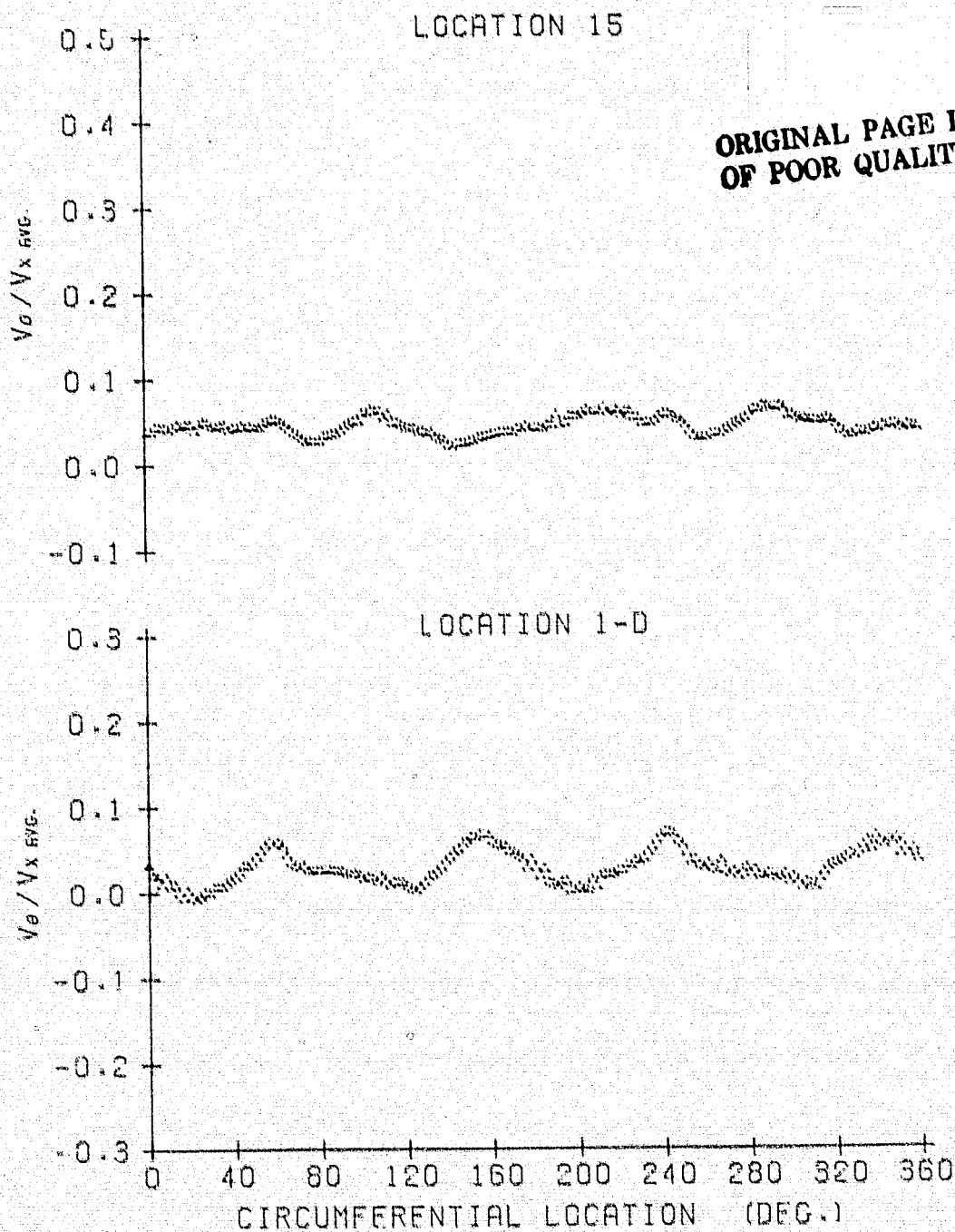


Figure D.32

10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1392

AVG. FLOW COEF. = 0.675
AVG. P-RISE COEF. = 0.093
AVG. INCIDENCE = 0.57 DEG.

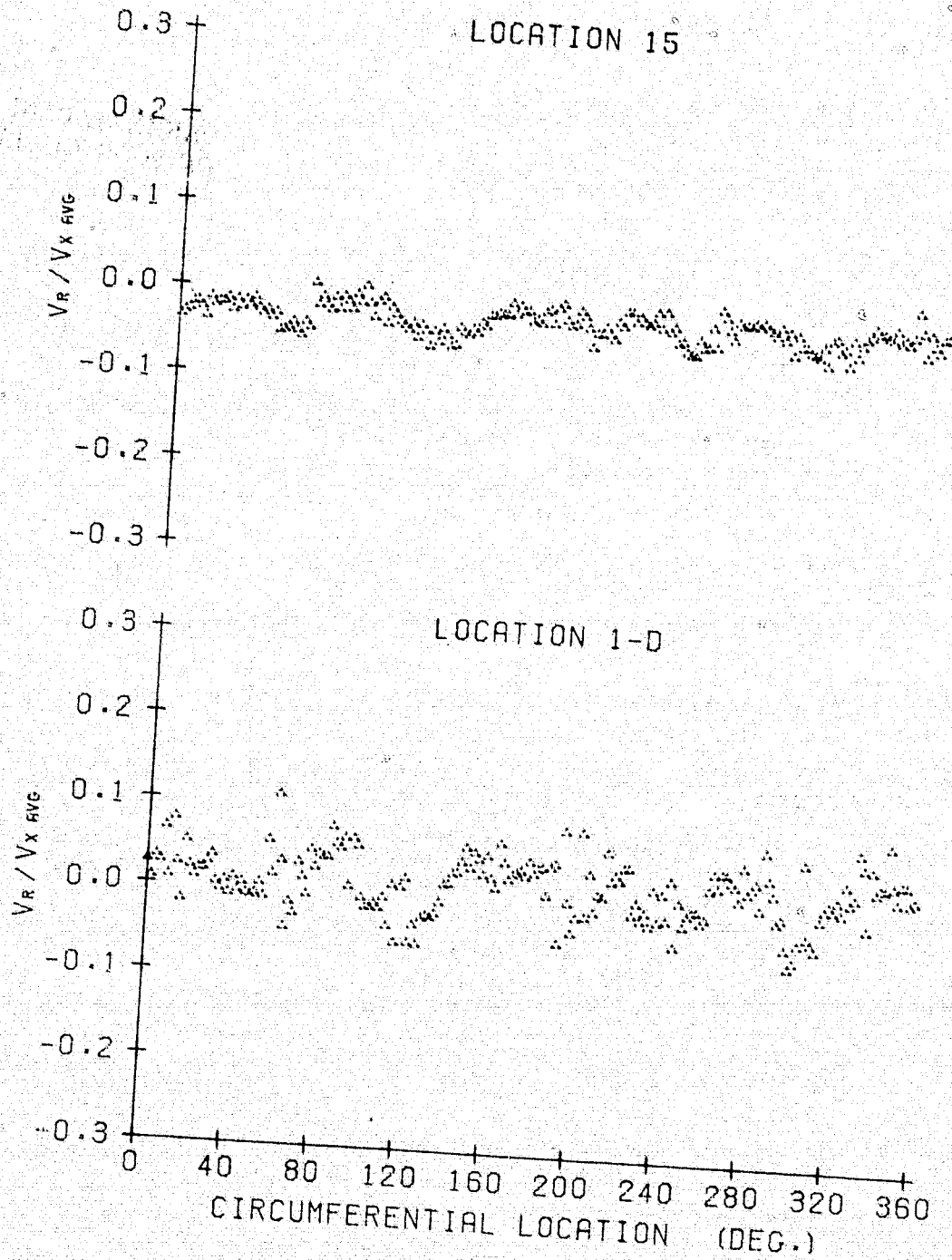


Figure D.33

10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1392

AVG. FLOW COEF. = 0.675
AVG. P-RISE COEF. = 0.093
AVG. INCIDENCE = 0.57 DEG.

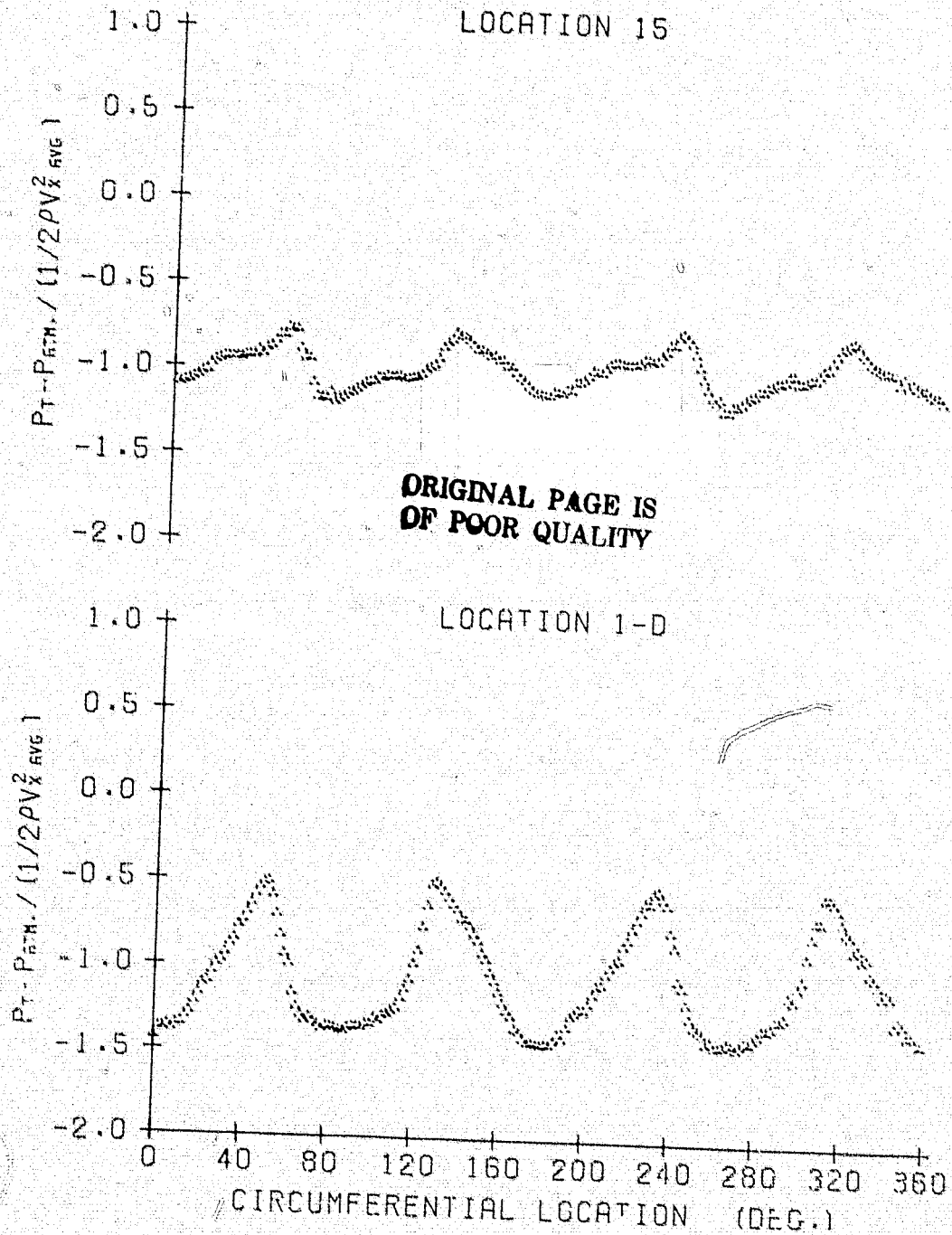


Figure D.34

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10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1392

AVG. FLOW COEF. = 0.675
AVG. P-RISE COEF. = 0.093
AVG. INCIDENCE = 0.57 DEG.

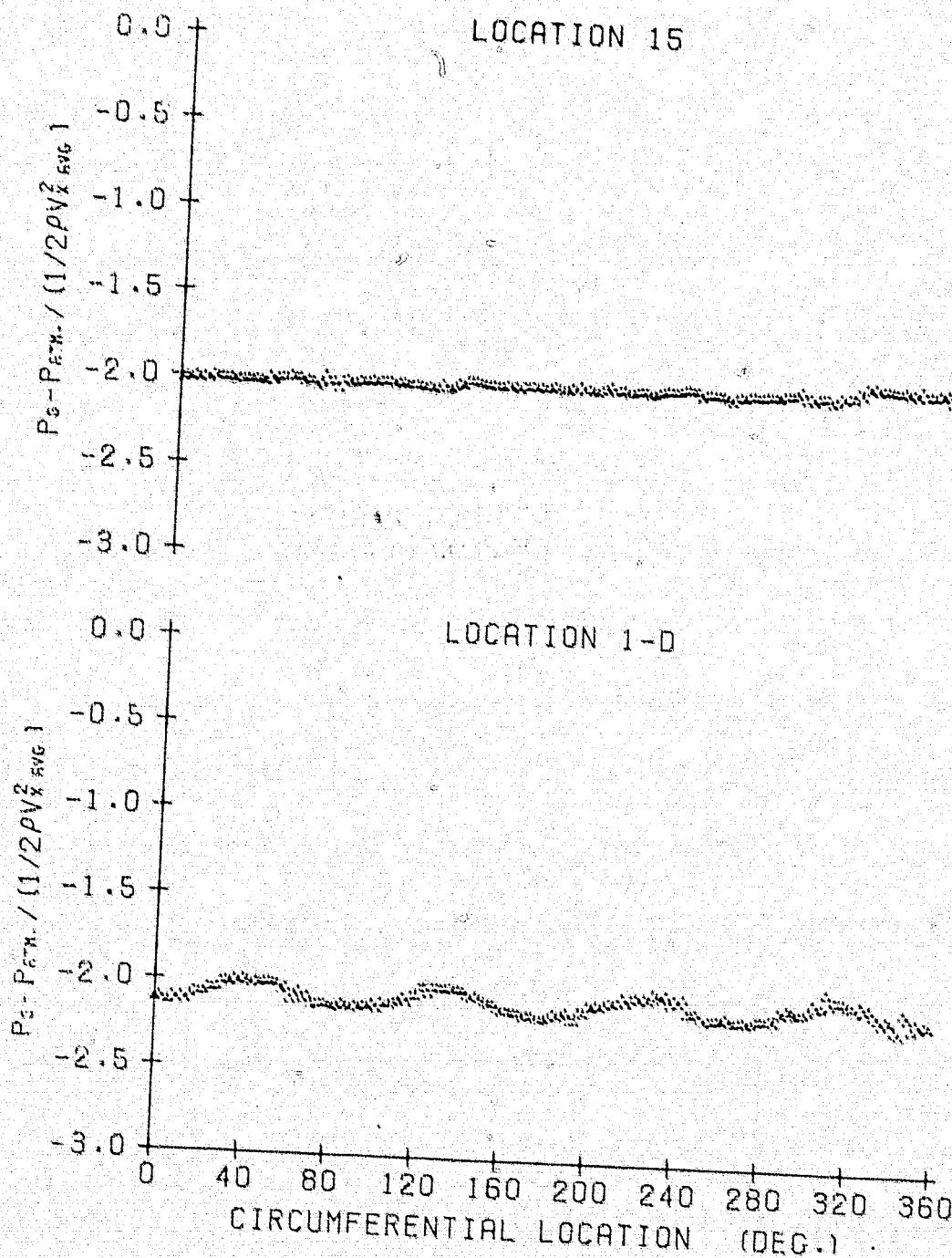


Figure D.35

10 October 1978
LCB:jep

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6 BLADES
55 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1392

AVG. FLOW COEF. = 0.675
AVG. P-RISE COEF. = 0.093
AVG. INCIDENCE = 0.57 DEG.

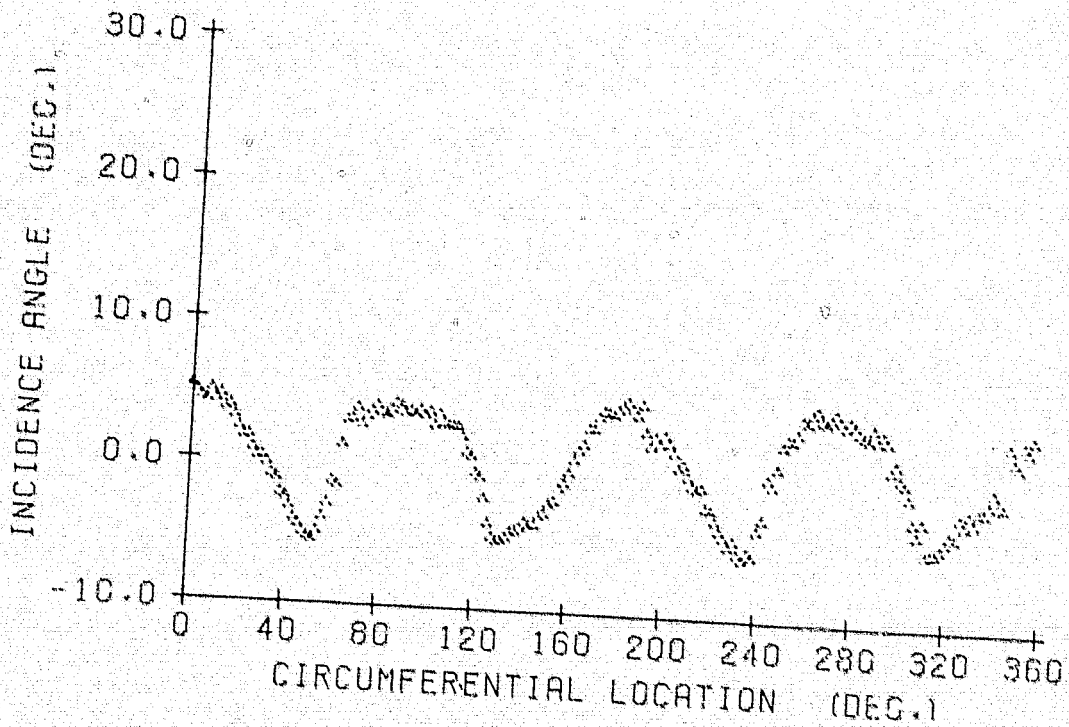


Figure D.36

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10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1622

AVG. FLOW COEF. = 0.526
AVG. P-RISE COEF. = 0.848
AVG. INCIDENCE = 6.78 DEG.

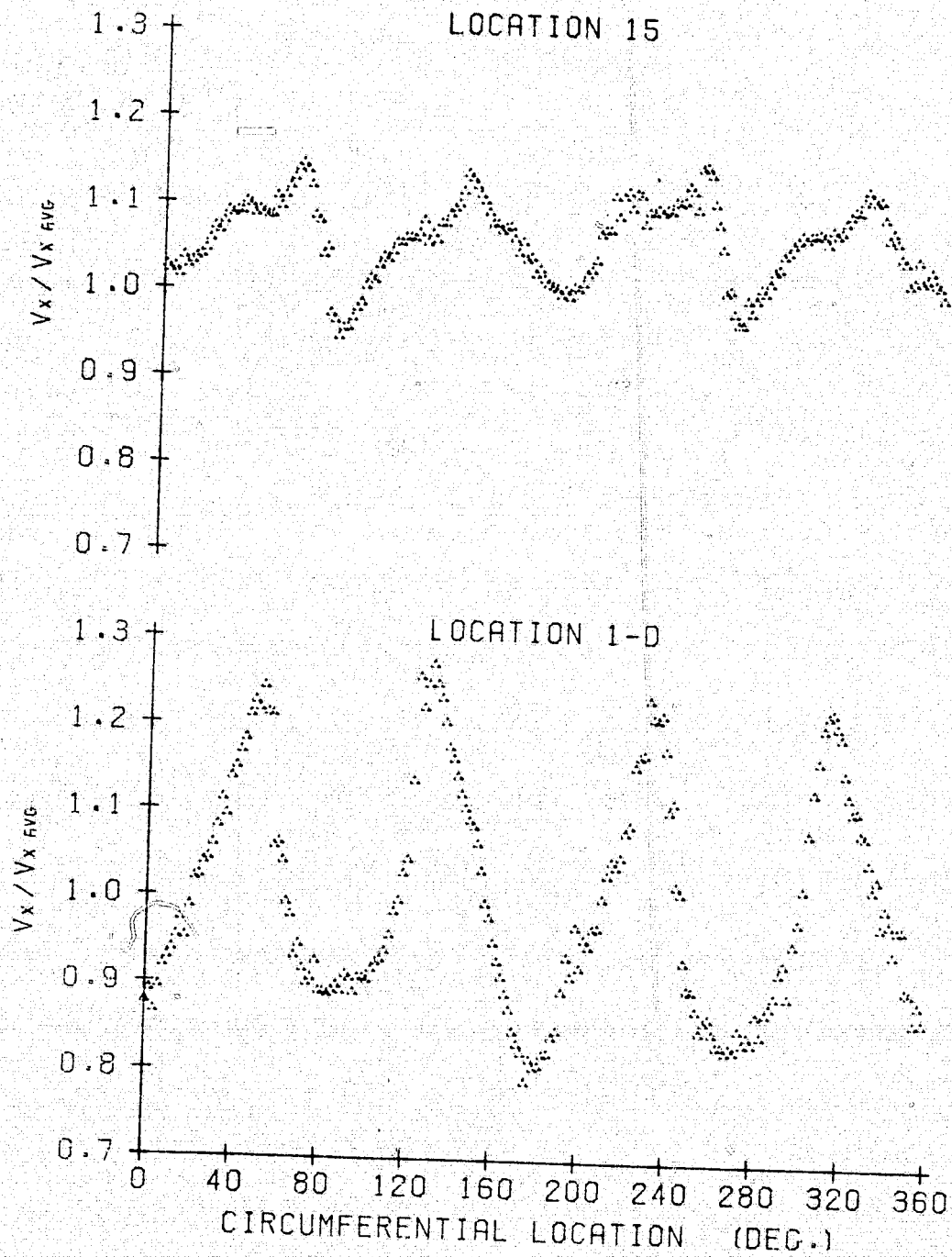


Figure D.37

10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1622

AVG. FLOW COEF. = 0.526
AVG. P-RISE COEF. = 0.848
AVG. INCIDENCE = 6.78 DEG.

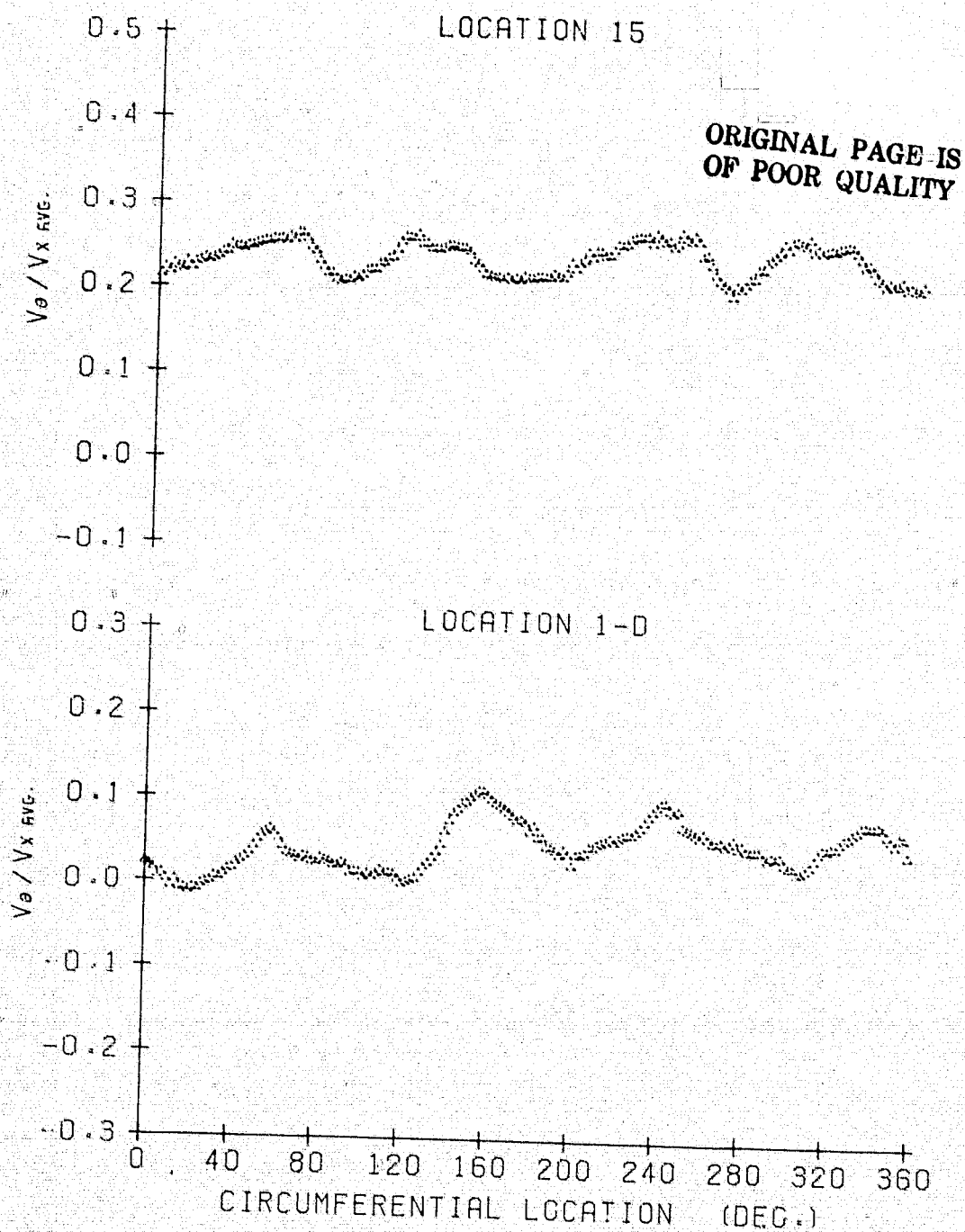


Figure D.38

10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1622

AVG. FLOW COEF. = 0.526
AVG. P-RISE COEF. = 0.848
AVG. INCIDENCE = 6.78 DEG.

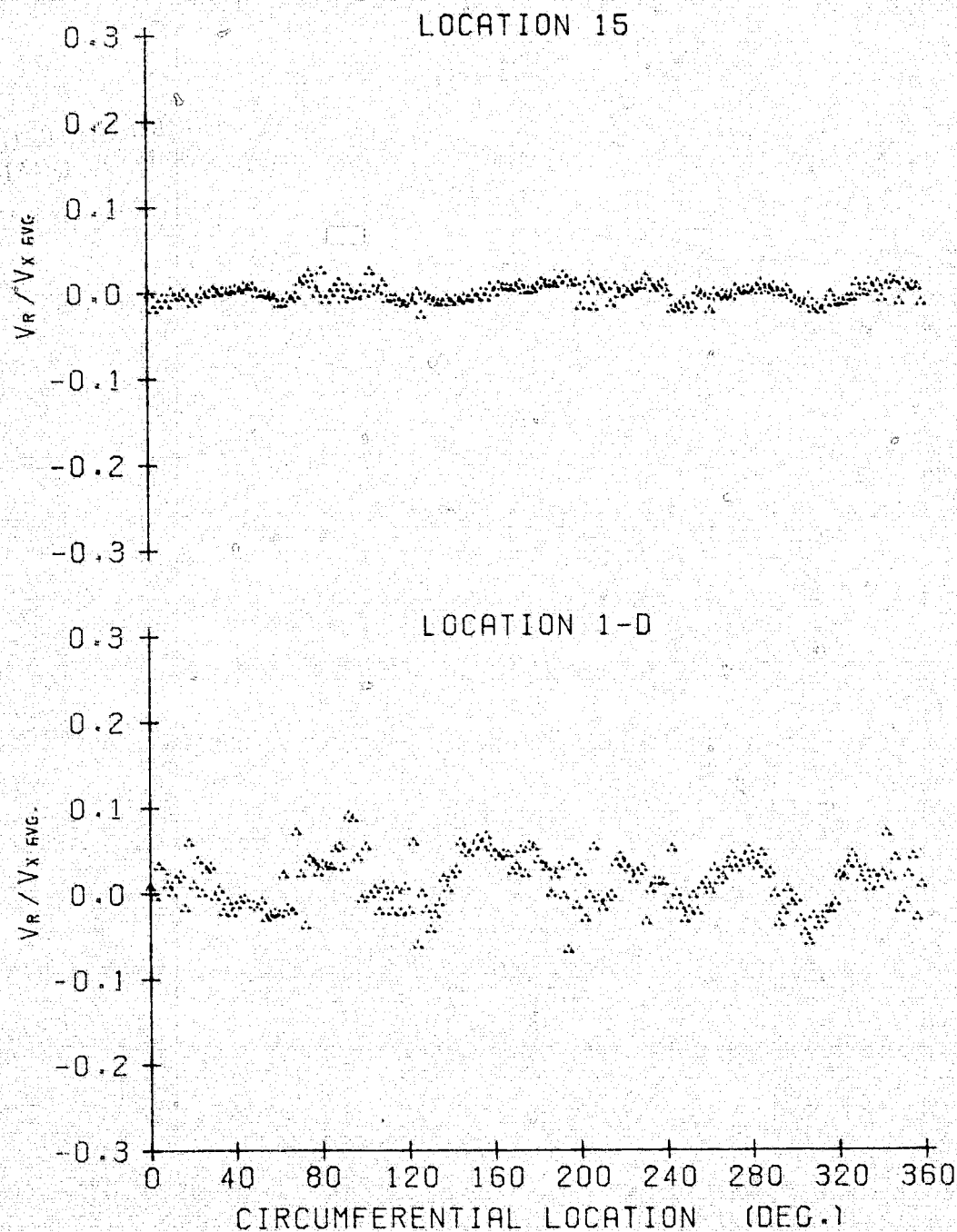


Figure D.39

10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1622

AVG. FLOW COEF. = 0.526
AVG. P-RISE COEF. = 0.848
AVG. INCIDENCE = 6.78 DEG.

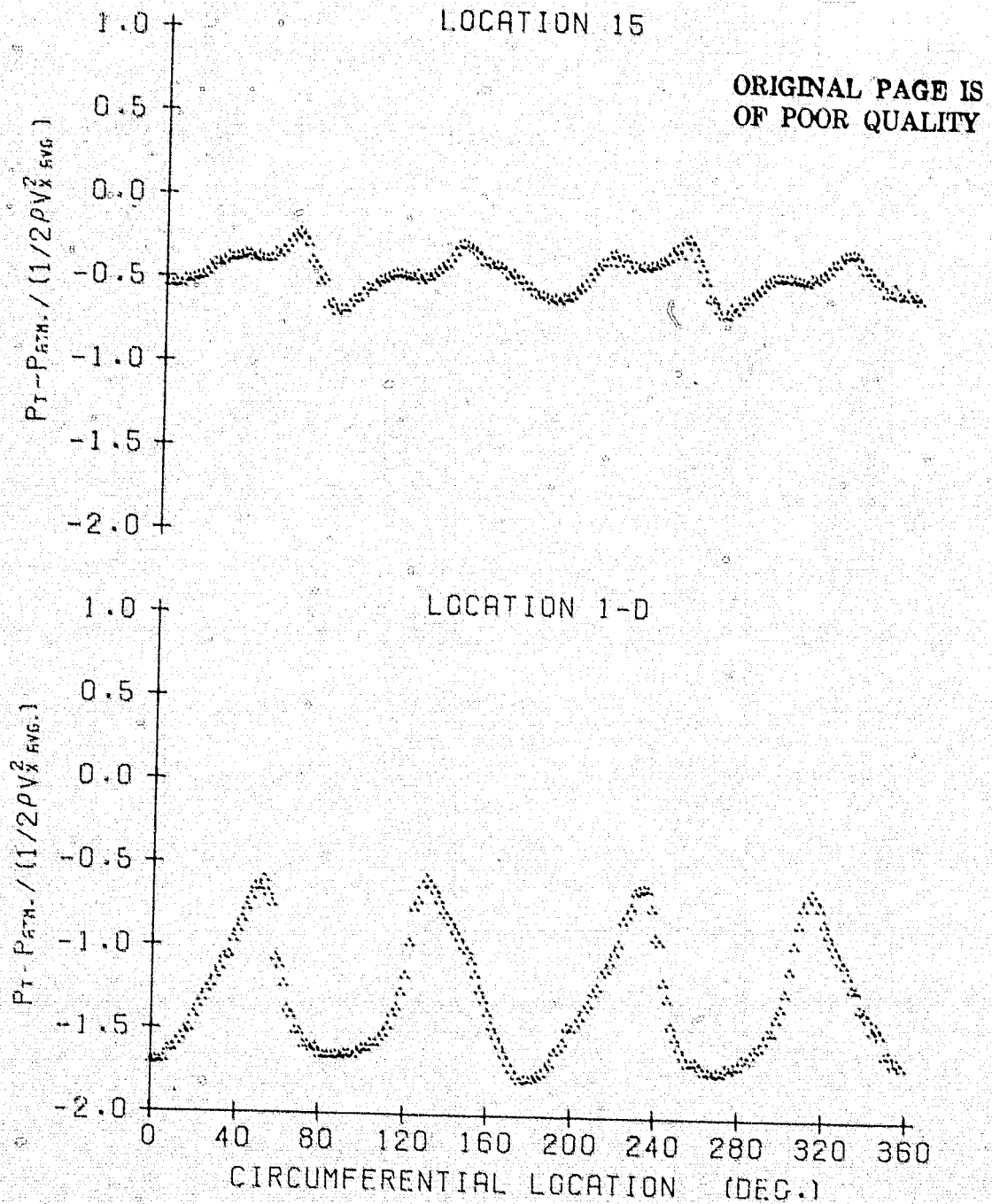


Figure D.40

10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1622

AVG. FLOW COEF. = 0.526
AVG. P-RISE COEF. = 0.848
AVG. INCIDENCE = 6.78 DEG.

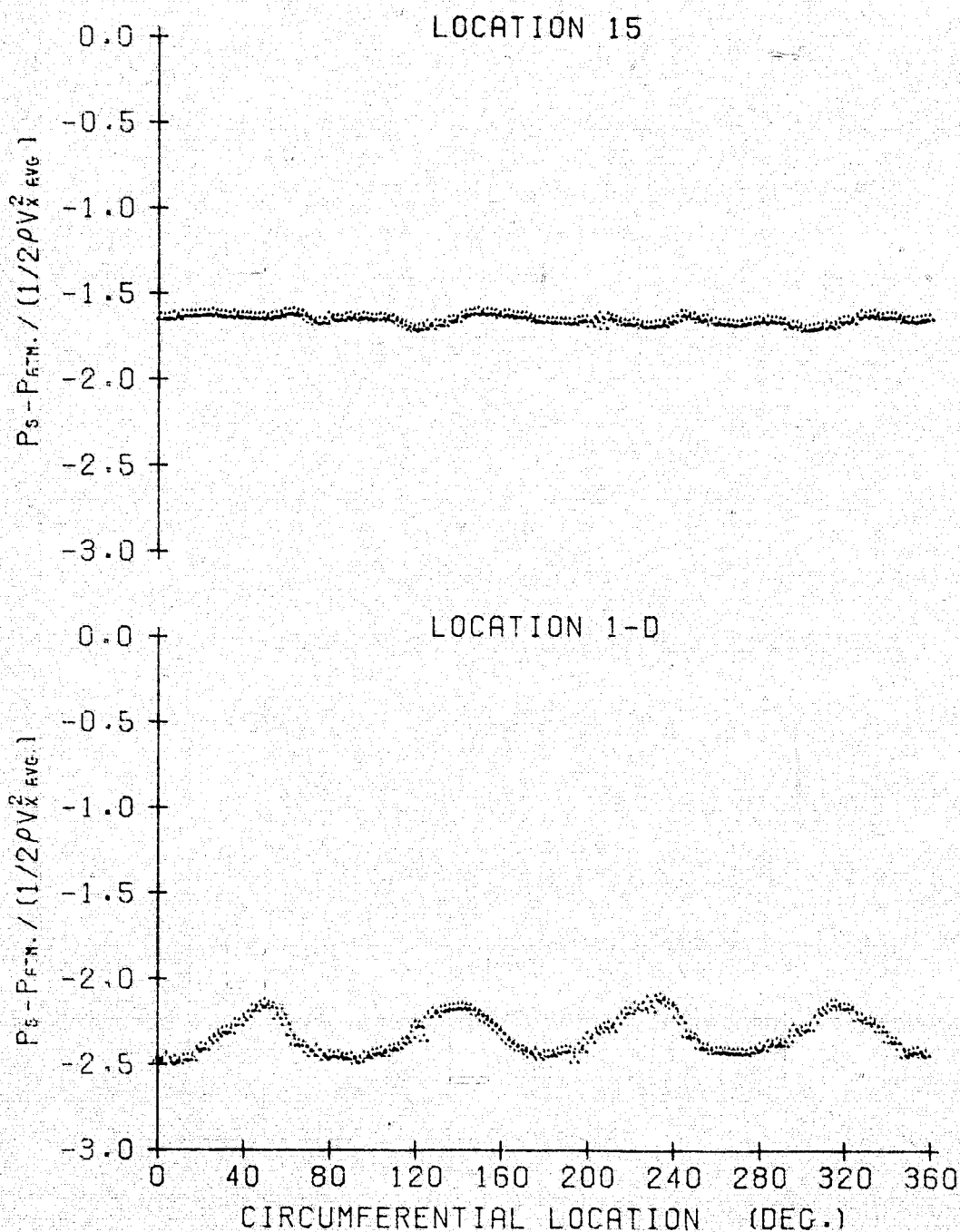


Figure D.41

10 October 1978
LCB:jep

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6 BLADES
55 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1622

AVG. FLOW COEF. = 0.526
AVG. P-RISE COEF. = 0.848
AVG. INCIDENCE = 6.78 DEG.

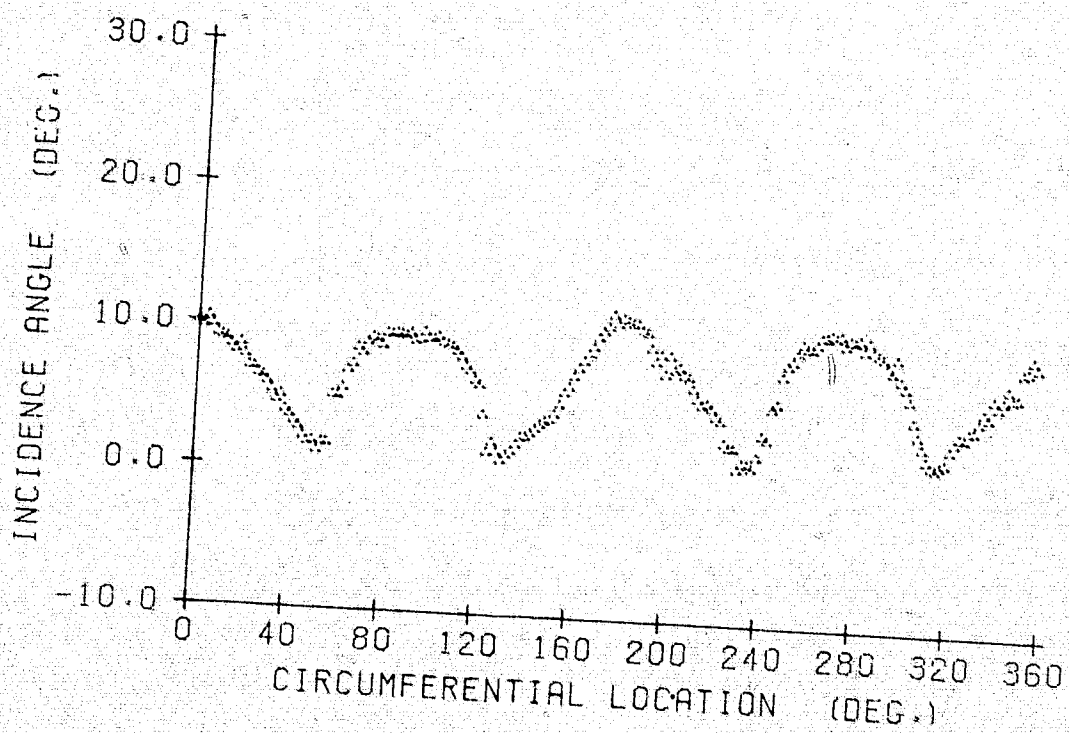


Figure D.42

10 October 1978
LCB:jep

5 SLADES
55 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM - 1913

AVG. FLOW COEF. = 0.493
AVG. P-RISE COEF. = 1.732
AVG. INCIDENCE = 8.35 DEG.

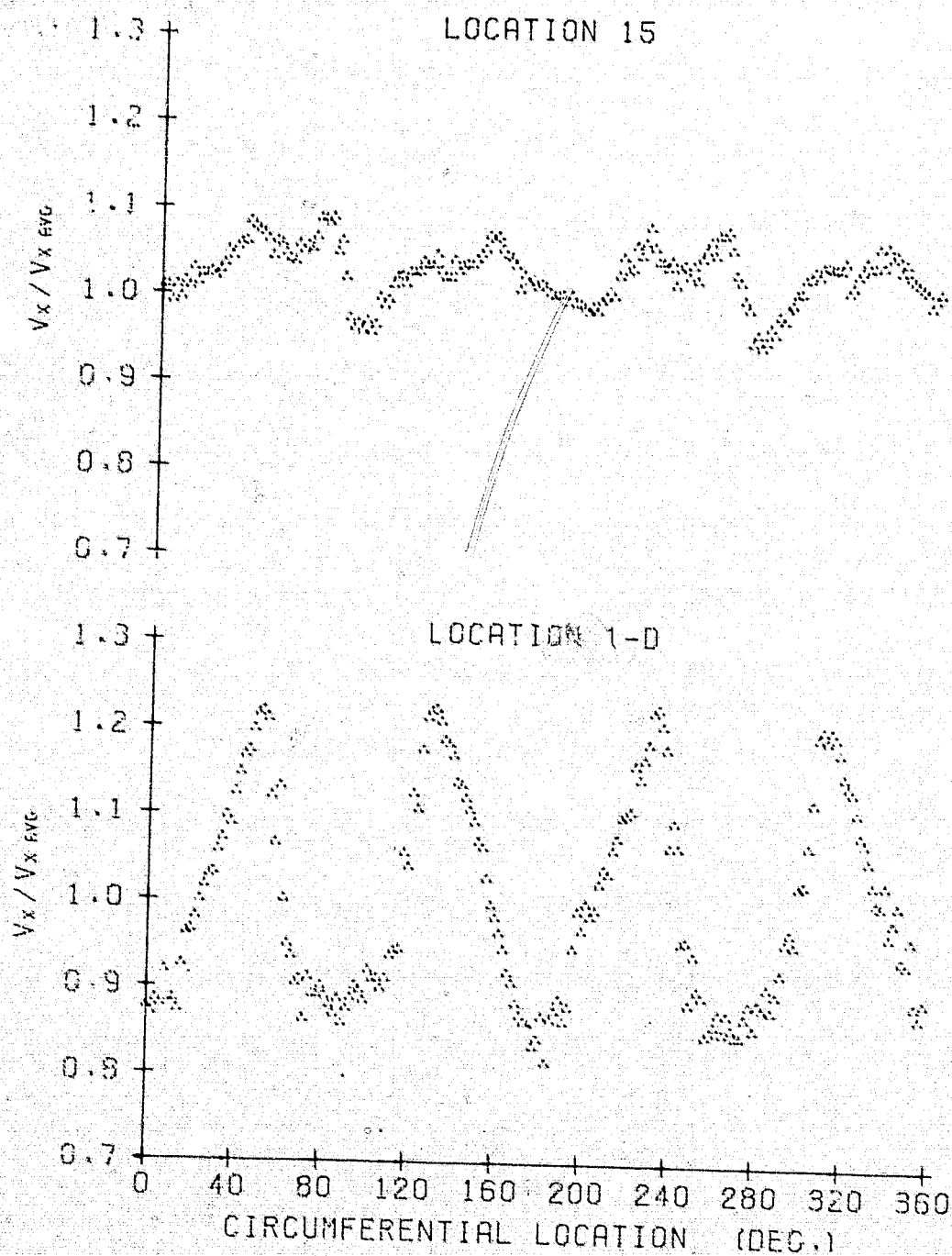


Figure D.43

10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1913

AVG. FLOW COEF. = 0.493
AVG. P-RISE COEF. = 1.732
AVG. INCIDENCE = 8.35 DEG.

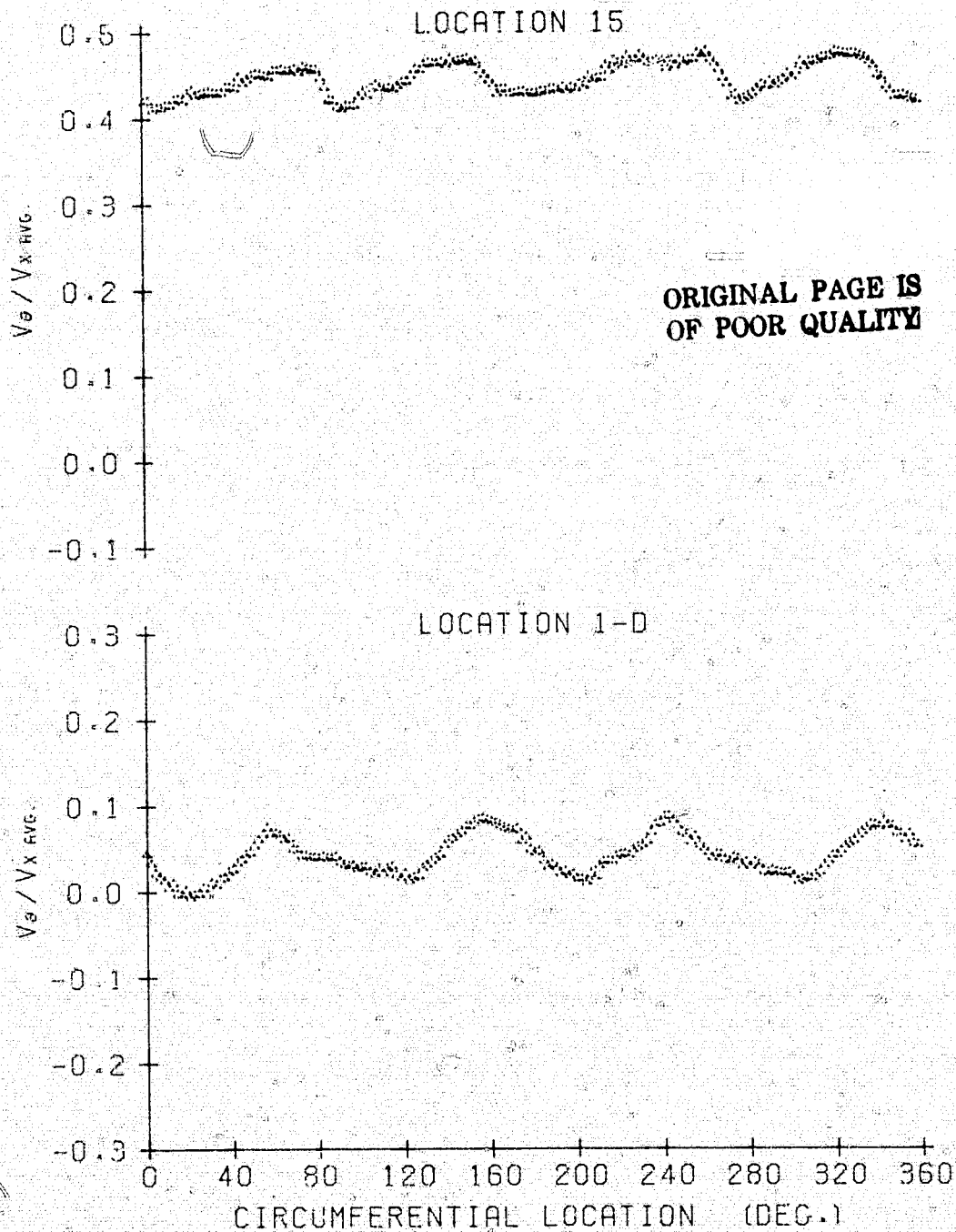


Figure D.44

10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1913

AVG. FLOW COEF. = 0.493
AVG. P-RISE COEF. = 1.732
AVG. INCIDENCE = 8.35 DEG.

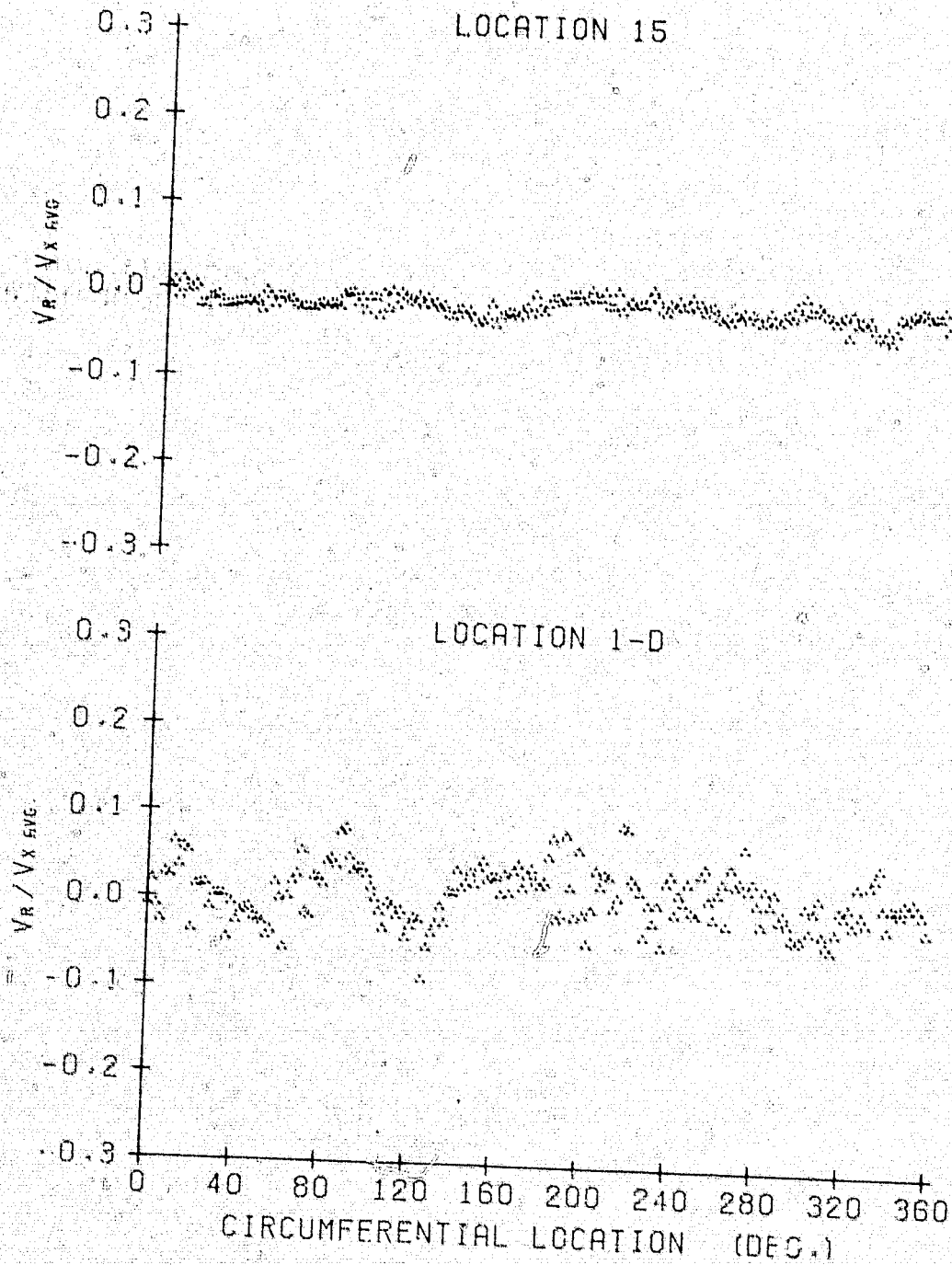


Figure D.45

6 BLADES
55 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1913

AVG. FLOW COEF. = 0.493
AVG. P-RISE COEF. = 1.732
AVG. INCIDENCE = 9.95 DEG.

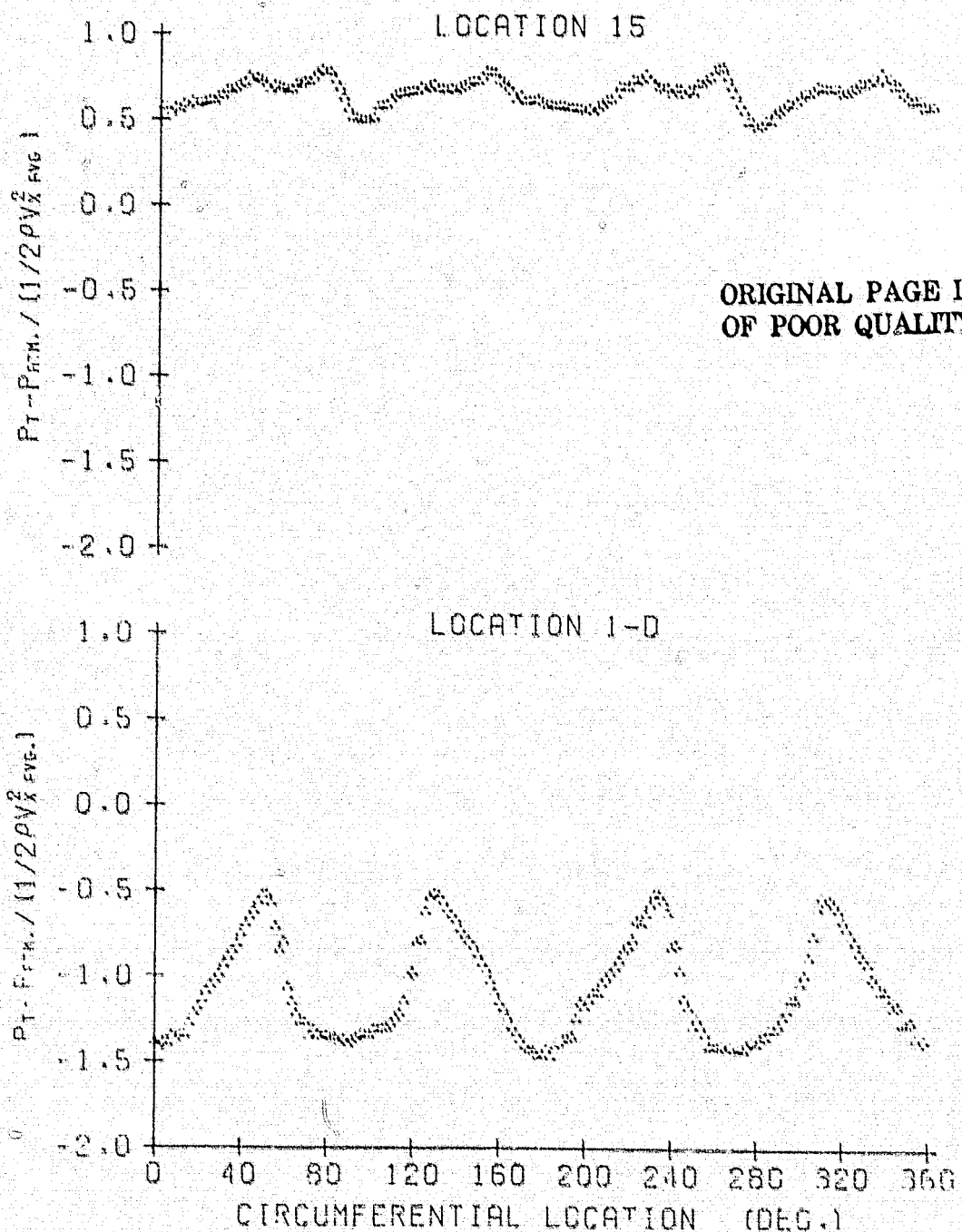


Figure D.46

10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM - 1913

AVG. FLOW COEF. = 0.493
AVG. P-RISE COEF. = 1.732
AVG. INCIDENCE = 8.35 DEG.

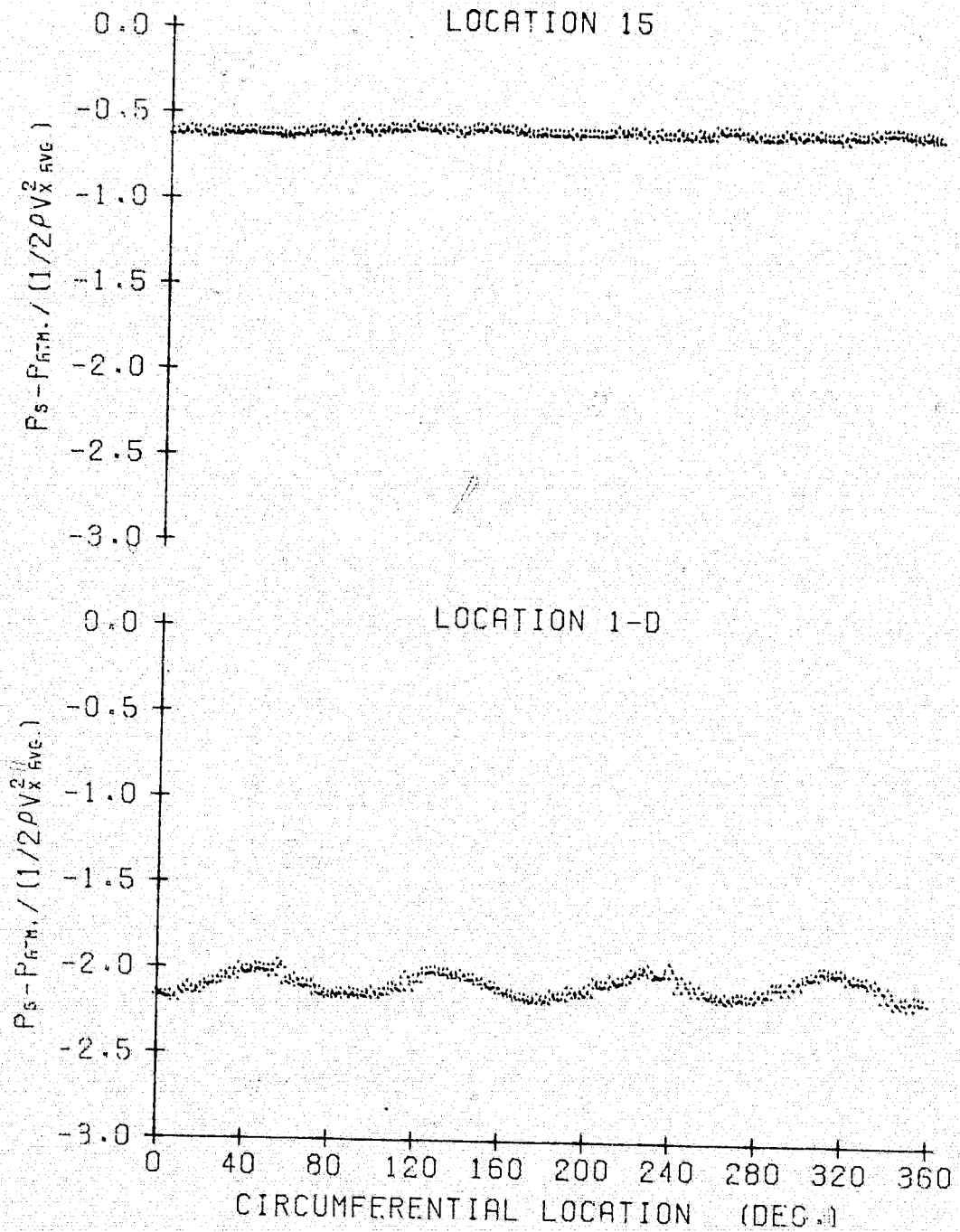


Figure D.47

10 October 1978
LCB:jep

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6 BLADES
55 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1913

AVG. FLOW COEF. = 0.493
AVG. P-RISE COEF. = 1.732
AVG. INCIDENCE = 8.35 DEG.

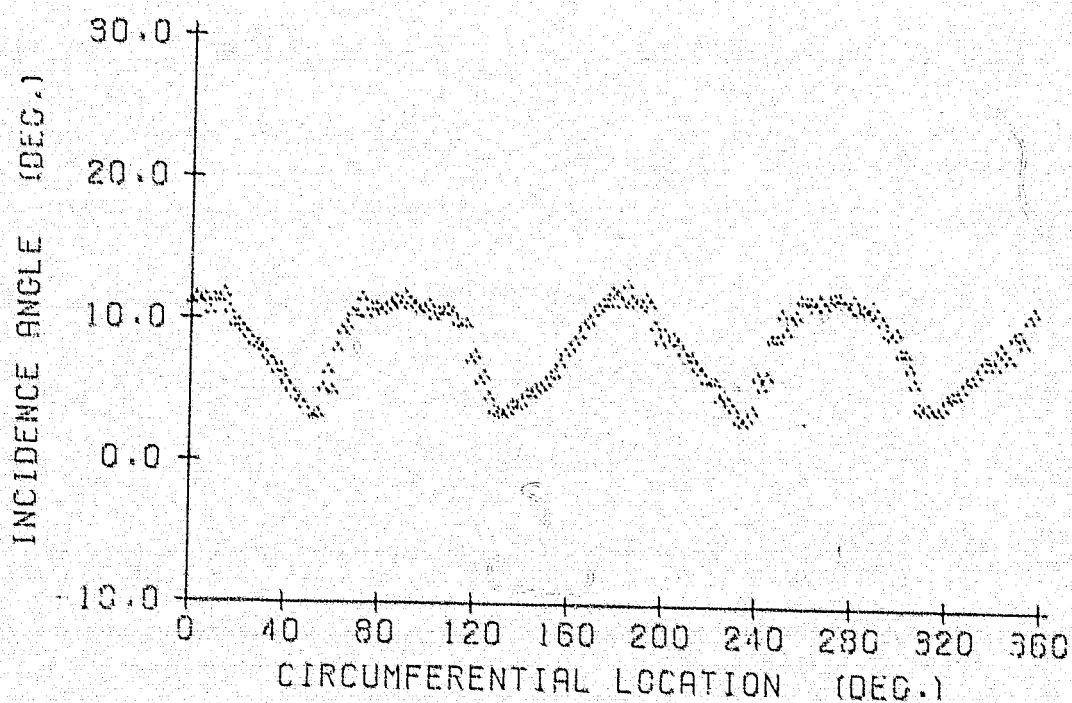


Figure D.48

-182-

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1492

AVG. FLOW COEF. = 0.620
AVG. P-RISE COEF. = 1.281
AVG. INCIDENCE = 1.86 DEG.

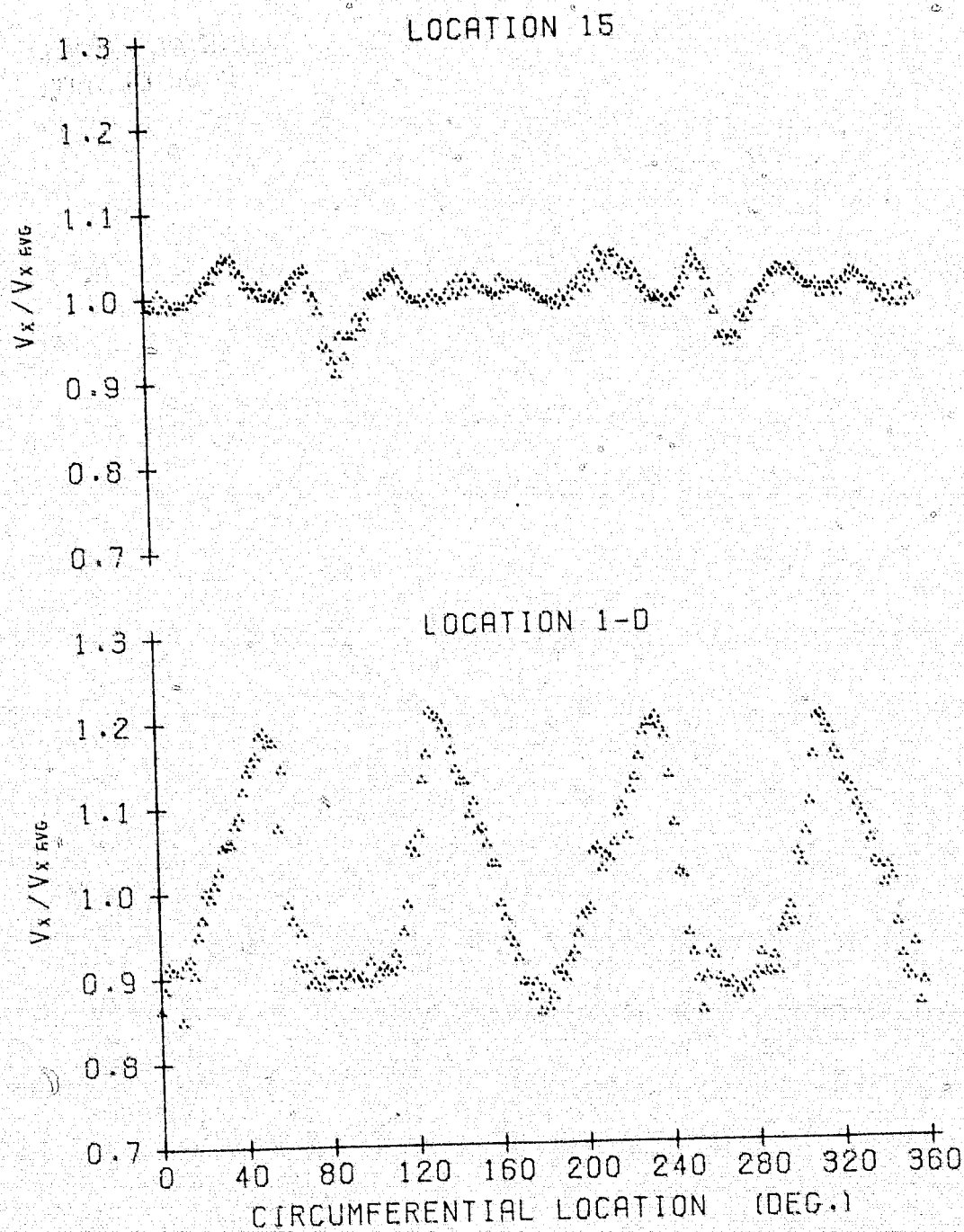


Figure D.49

10 October 1978

LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1492

AVG. FLOW COEF. = 0.620
AVG. P-RISE COEF. = 1.281
AVG. INCIDENCE = 1.88 DEG.

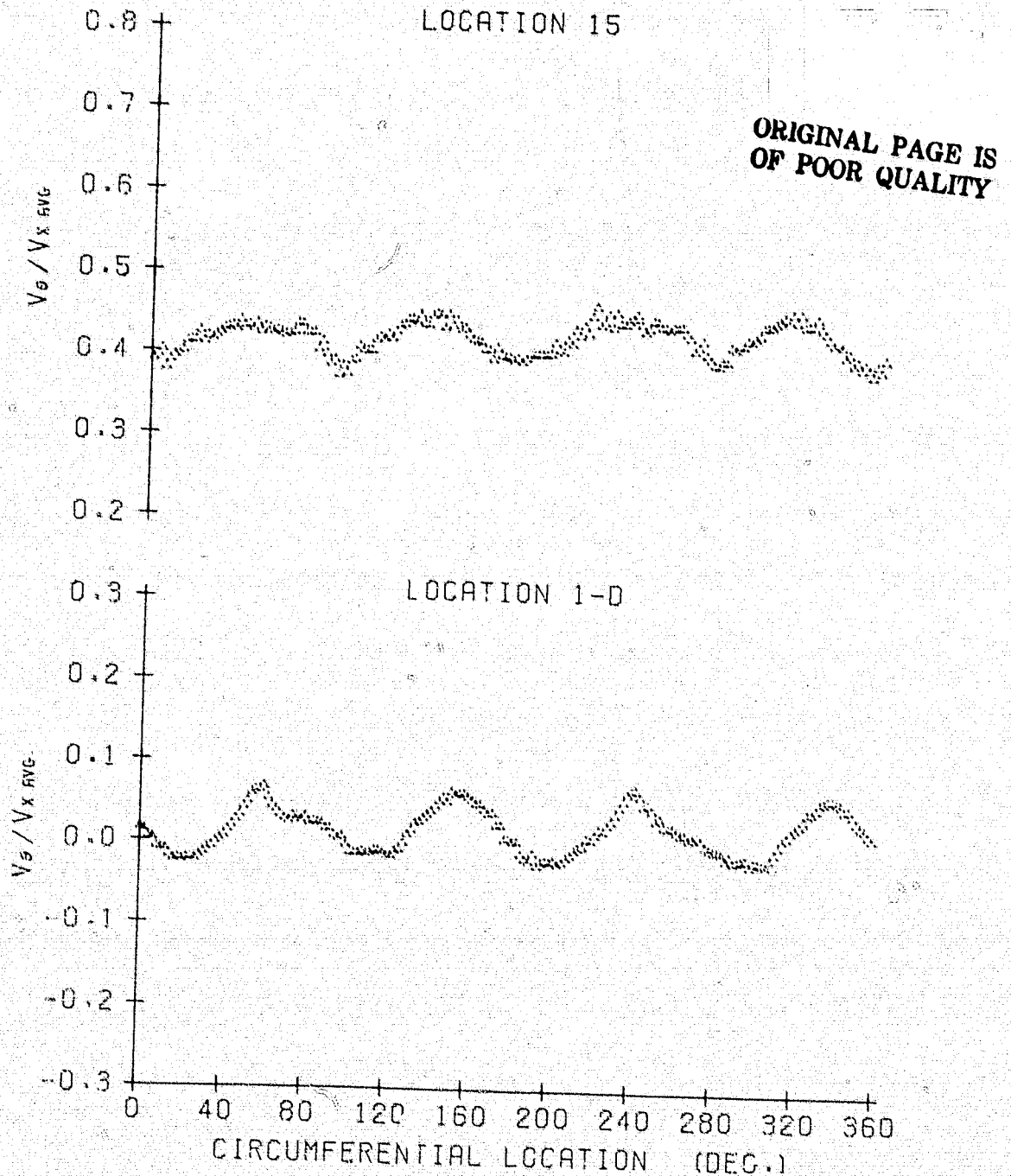


Figure D.50

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10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1492

AVG. FLOW COEF. = 0.620
AVG. P-RISE COEF. = 1.281
AVG. INCIDENCE = 1.88 DEG.

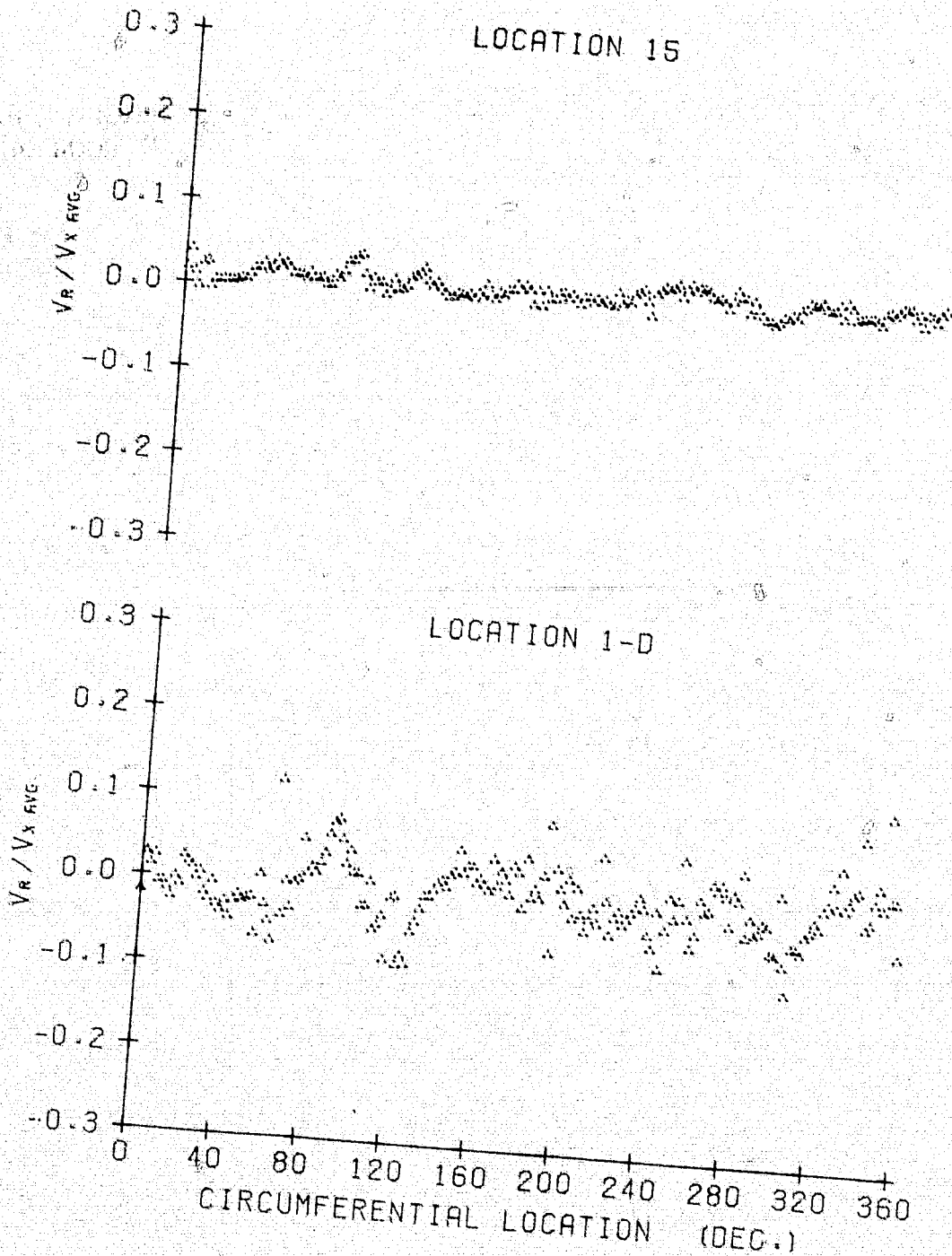


Figure D.51

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1492

AVG. FLOW COEF. = 0.620
AVG. P-RISE COEF. = 1.281
AVG. INCIDENCE = 1.88 DEG.

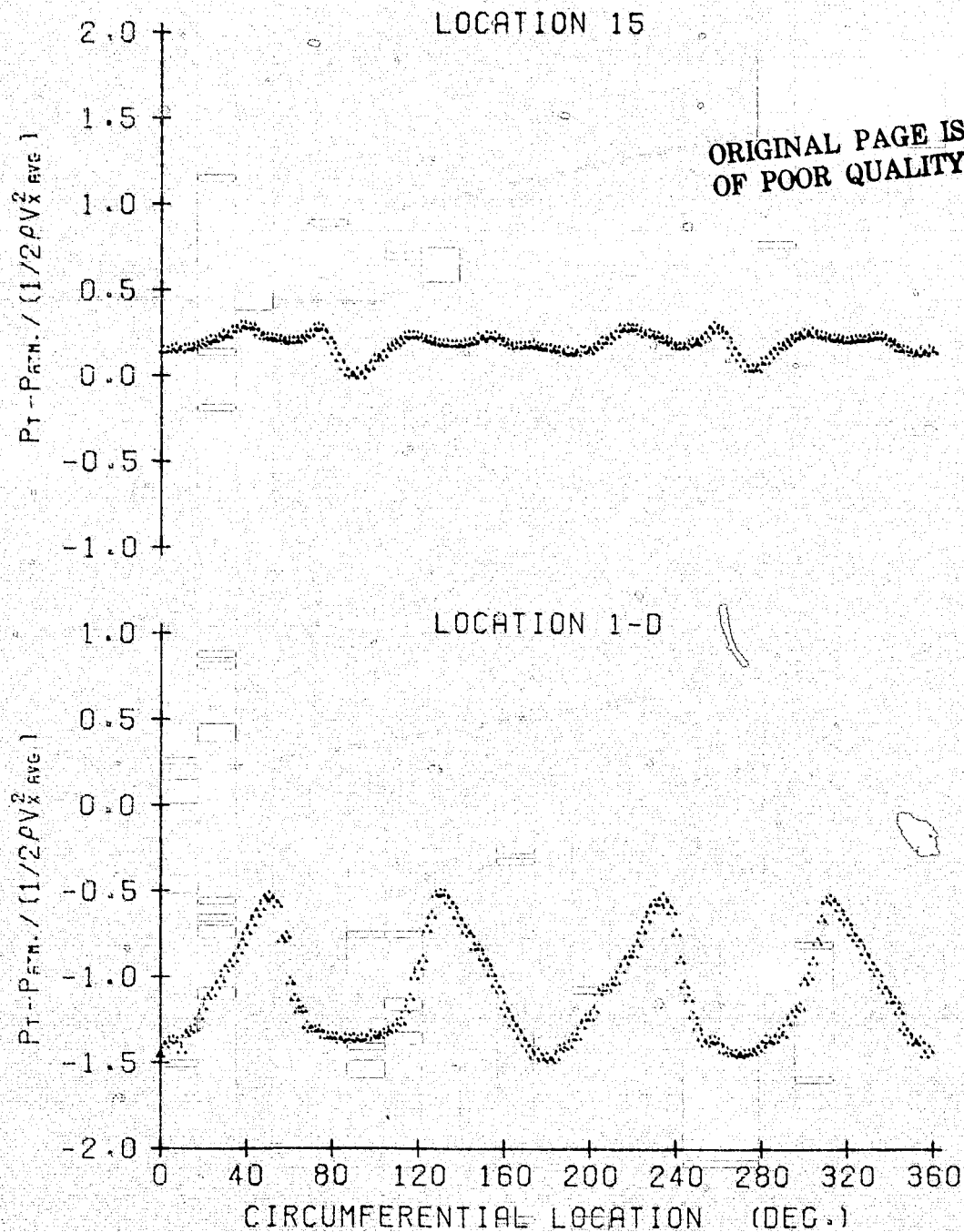


Figure D.52

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1492

AVG. FLOW COEFF. = 0.620
AVG. P-RISE COEF. = 1.281
AVG. INCIDENCE = 1.88 DEG.

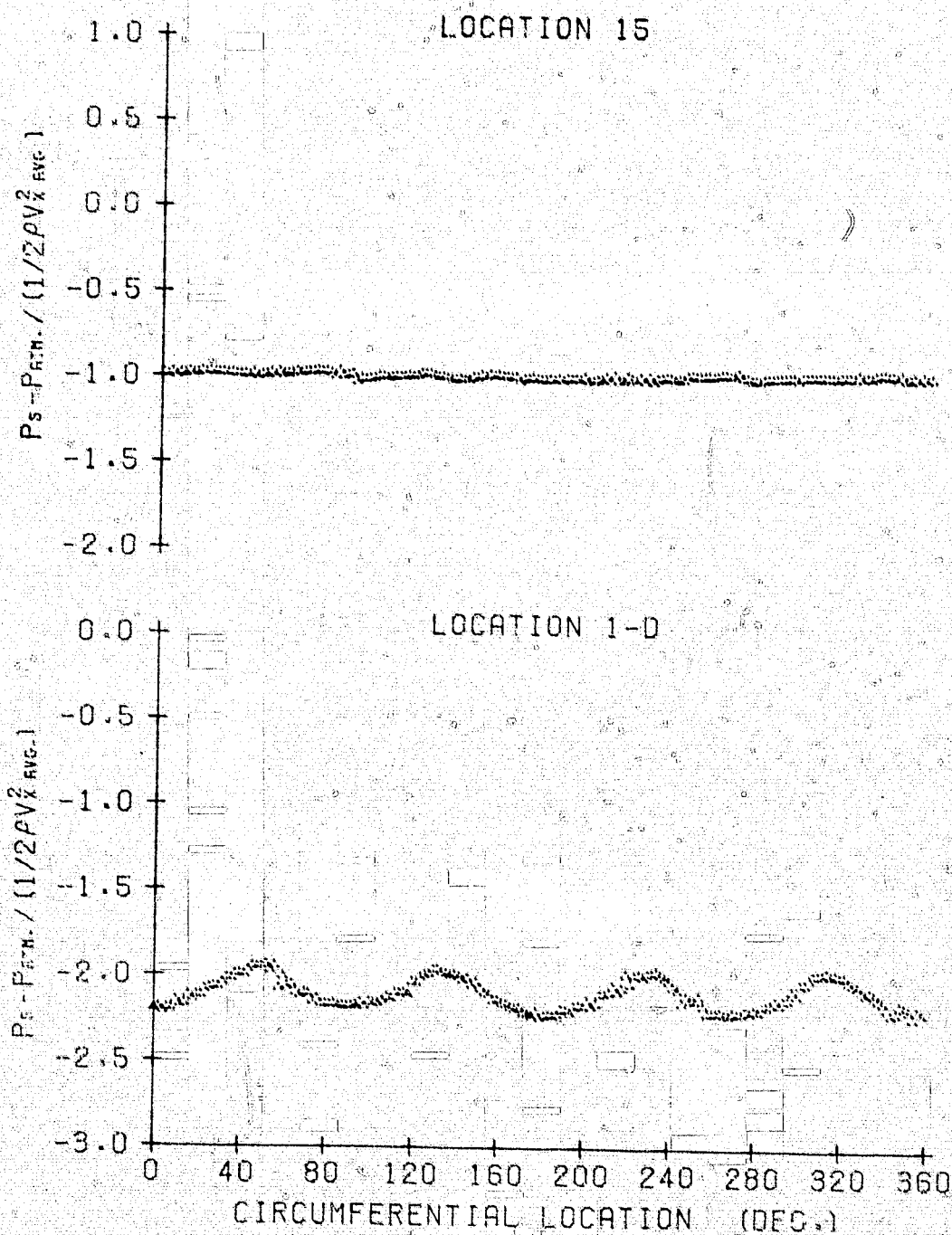


Figure D.53

10 October 1978
LCB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1492

AVG. FLOW COEF. = 0.620
AVG. P-RISE COEF. = 1.281
AVG. INCIDENCE = 1.88 DEG.

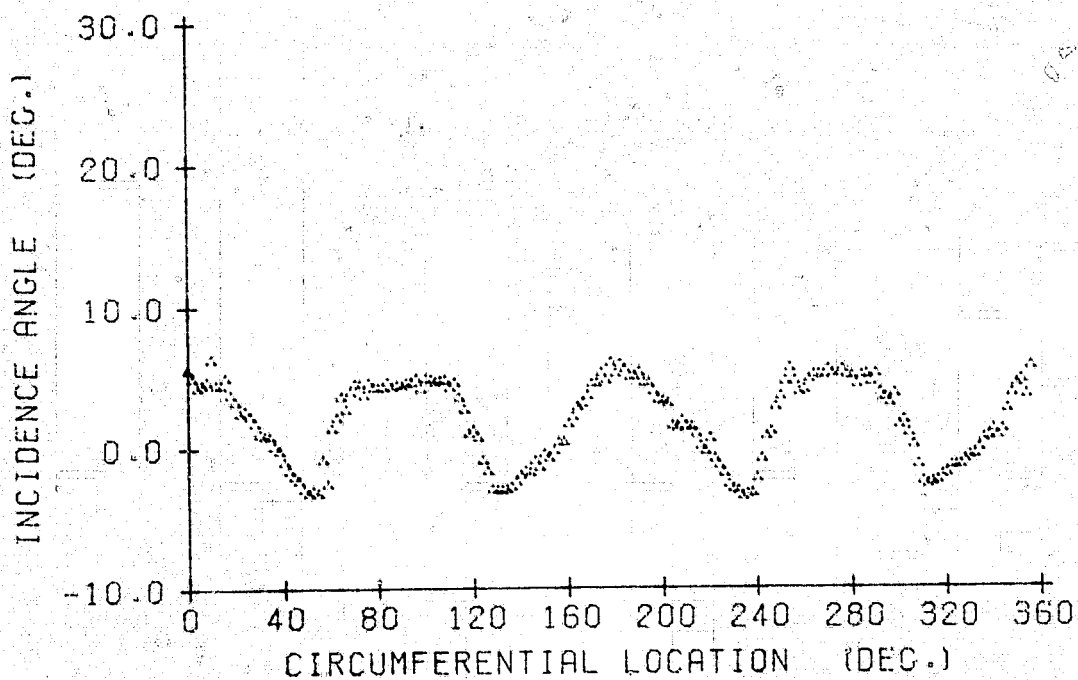


Figure D.54

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10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1663

AVG. FLOW COEF. = 0.536
AVG. P-RISE COEF. = 2.248
AVG. INCIDENCE = 5.47 DEG.

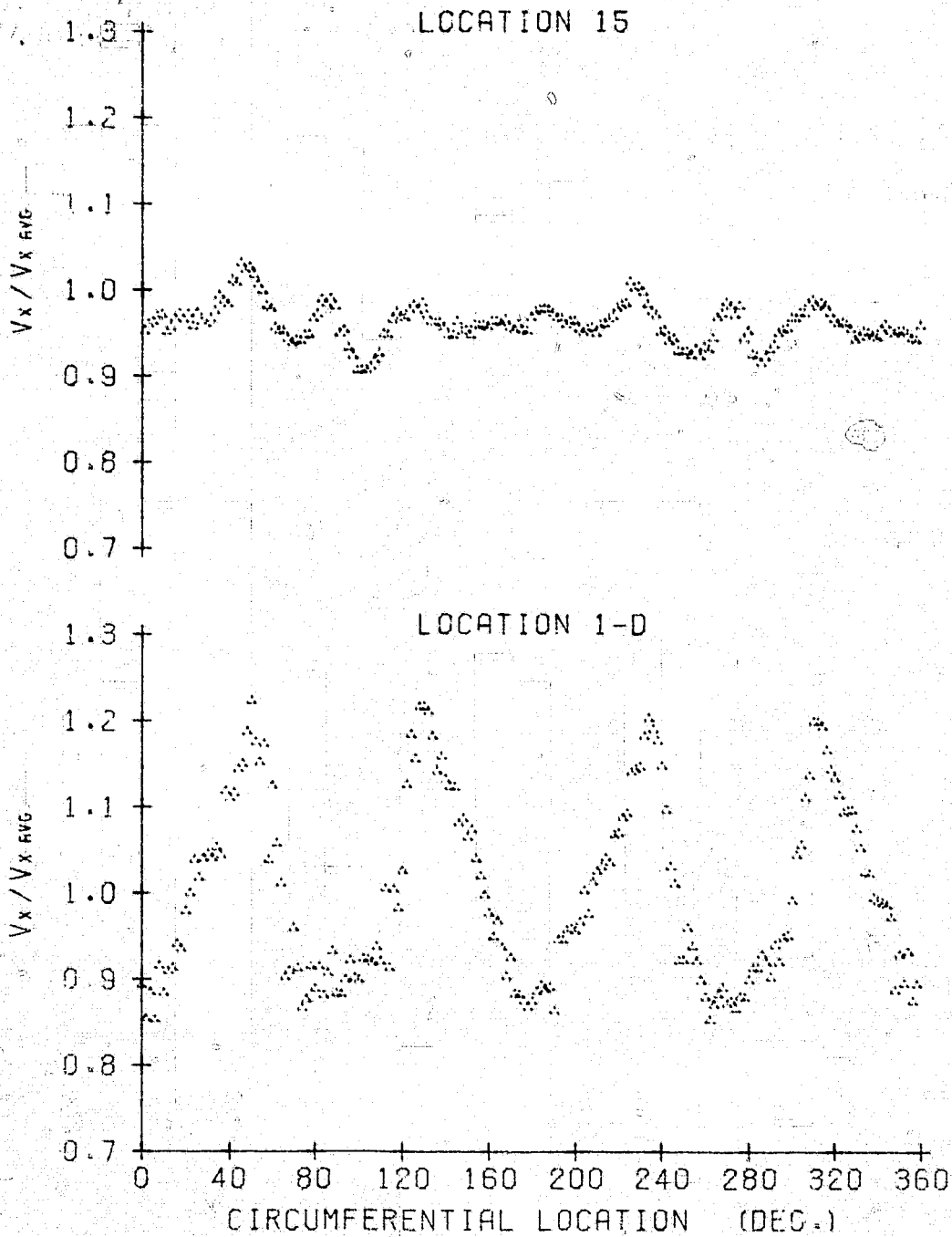


Figure D.55

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1663

AVG. FLOW COEF. = 0.536
AVG. P-RISE COEF. = 2.248
AVG. INCIDENCE = 5.47 DEG.

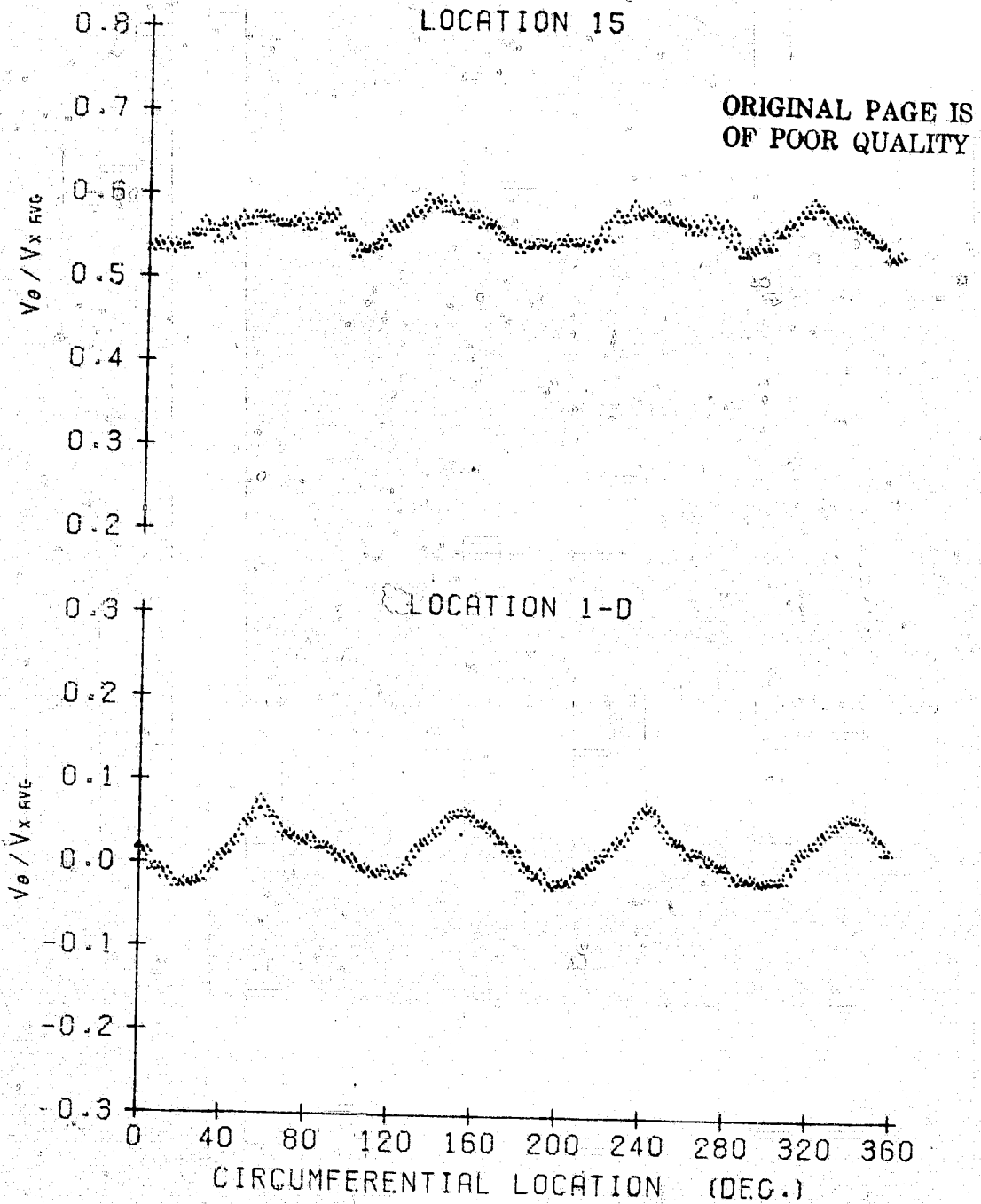


Figure D.56

10 October 1978
LCB:jep

3 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1663

AVG. FLOW COEF. = 0.536
AVG. P-RISE COEF. = 2.248
AVG. INCIDENCE = 5.47 DEG.

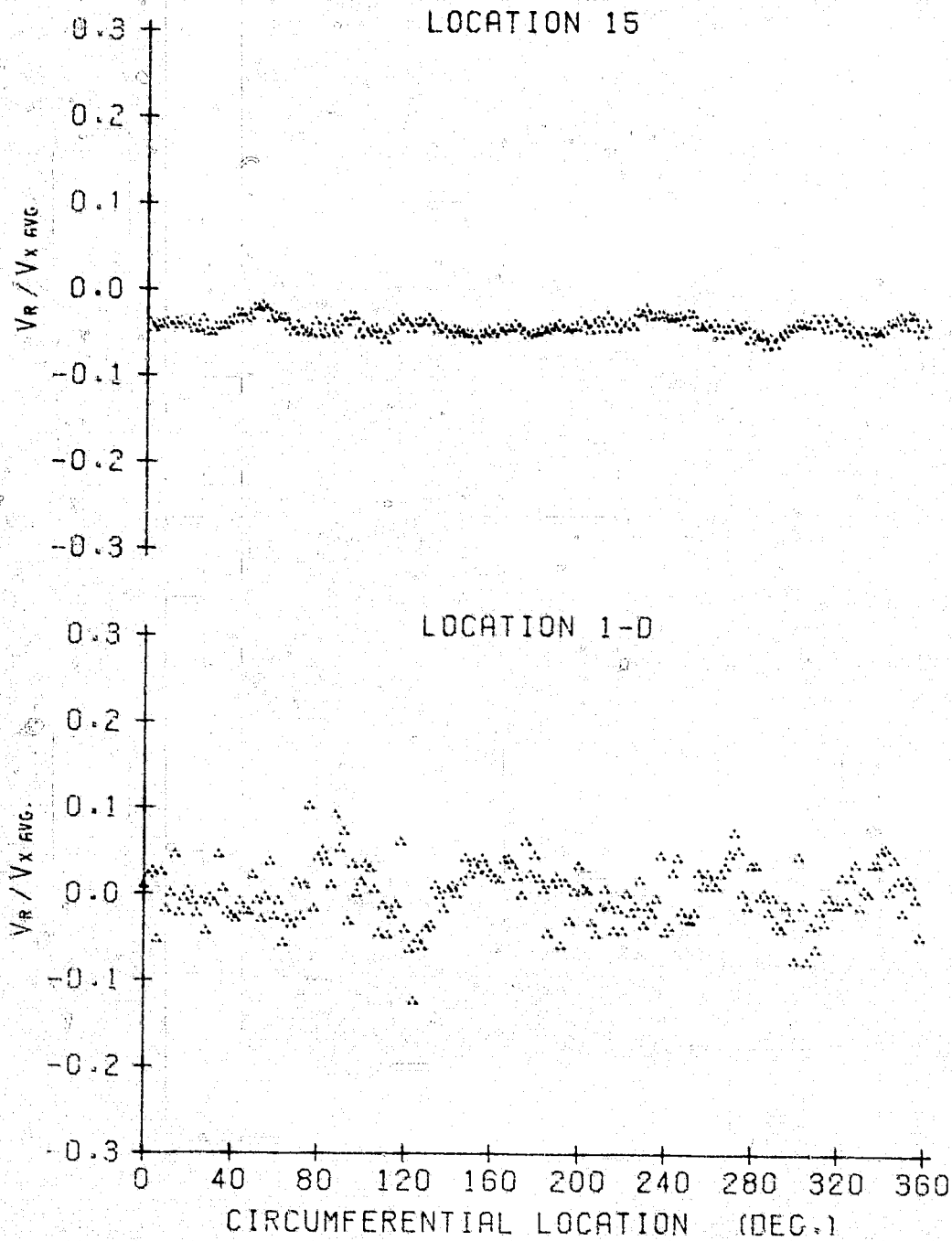


Figure D.57

C-3

-191-

10 October 1978

LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM : 1663

AVG. FLOW COEF. = 0.536
AVG. P-RISE COEF. = 2.248
AVG. INCIDENCE = 5.47 DEG.

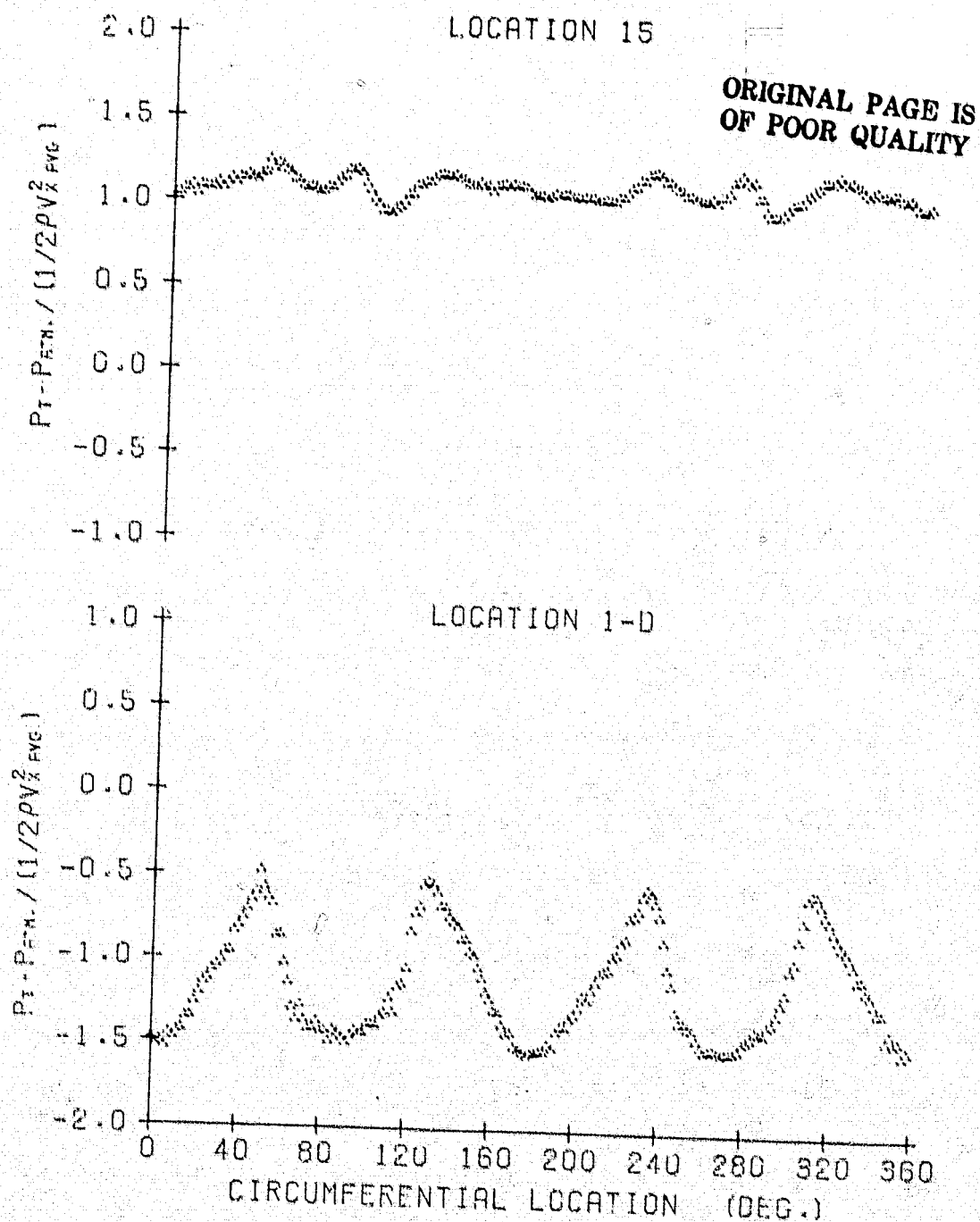


Figure D.58

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1663

AVG. FLOW COEFF. = 0.536
AVG. P-RISE COEFF. = 2.248
AVG. INCIDENCE = 5.47 DEG.

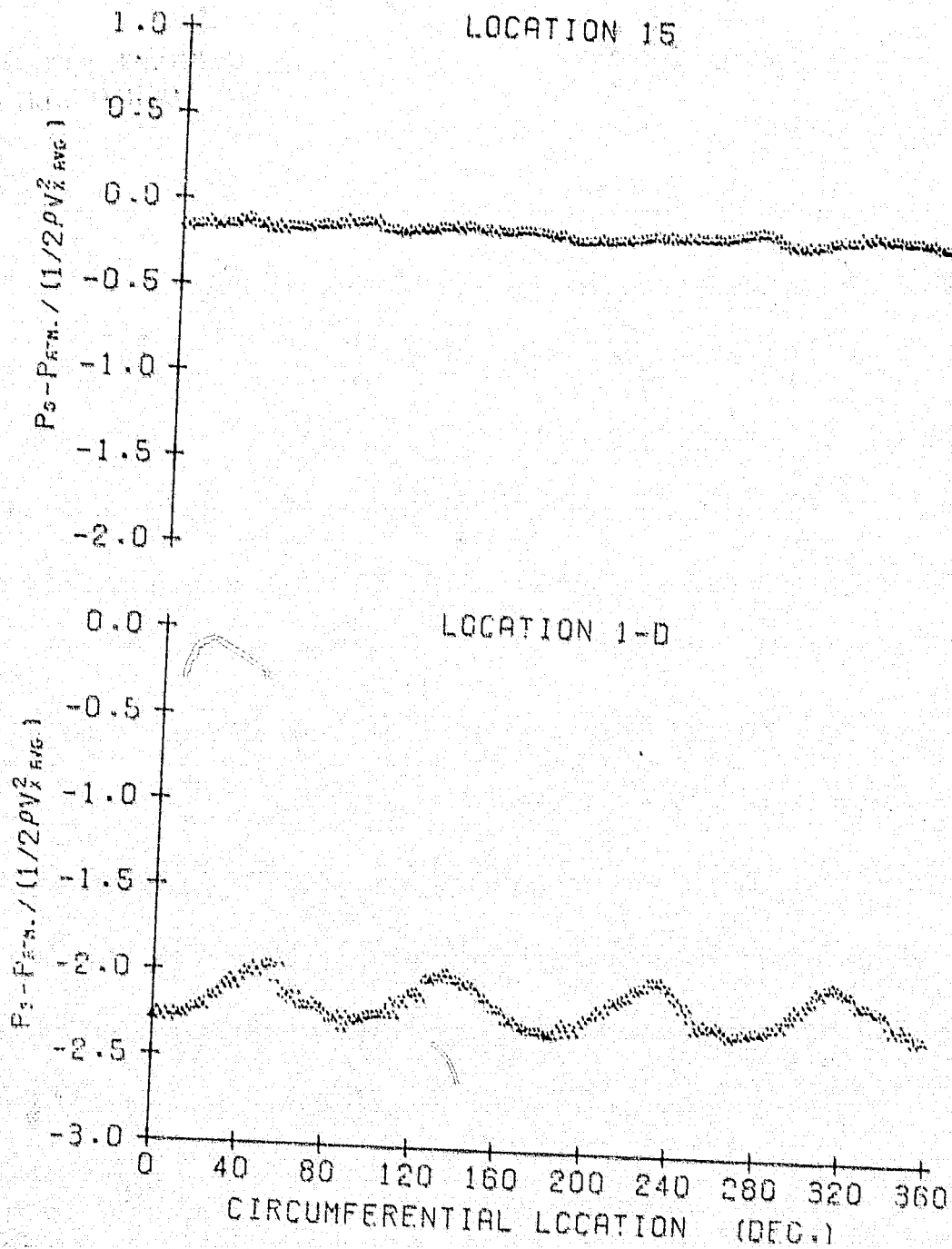


Figure D.59

10 October 1978
LCB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1663

AVG. FLOW COEF. = 0.536
AVG. P-RISE COEF. = 2.248
AVG. INCIDENCE = 5.47 DEG.

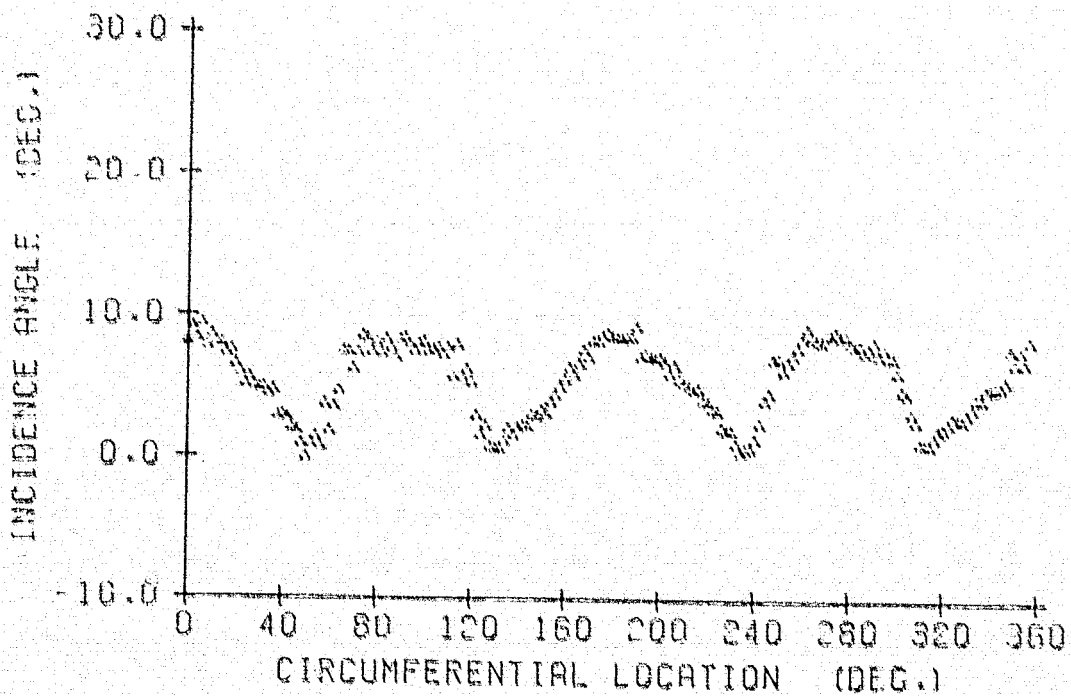


Figure D.60

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1798

AVG. FLOW COEF. = 0.492
AVG. P-RISE COEF. = 2.951
AVG. INCIDENCE = 7.50 DEG.

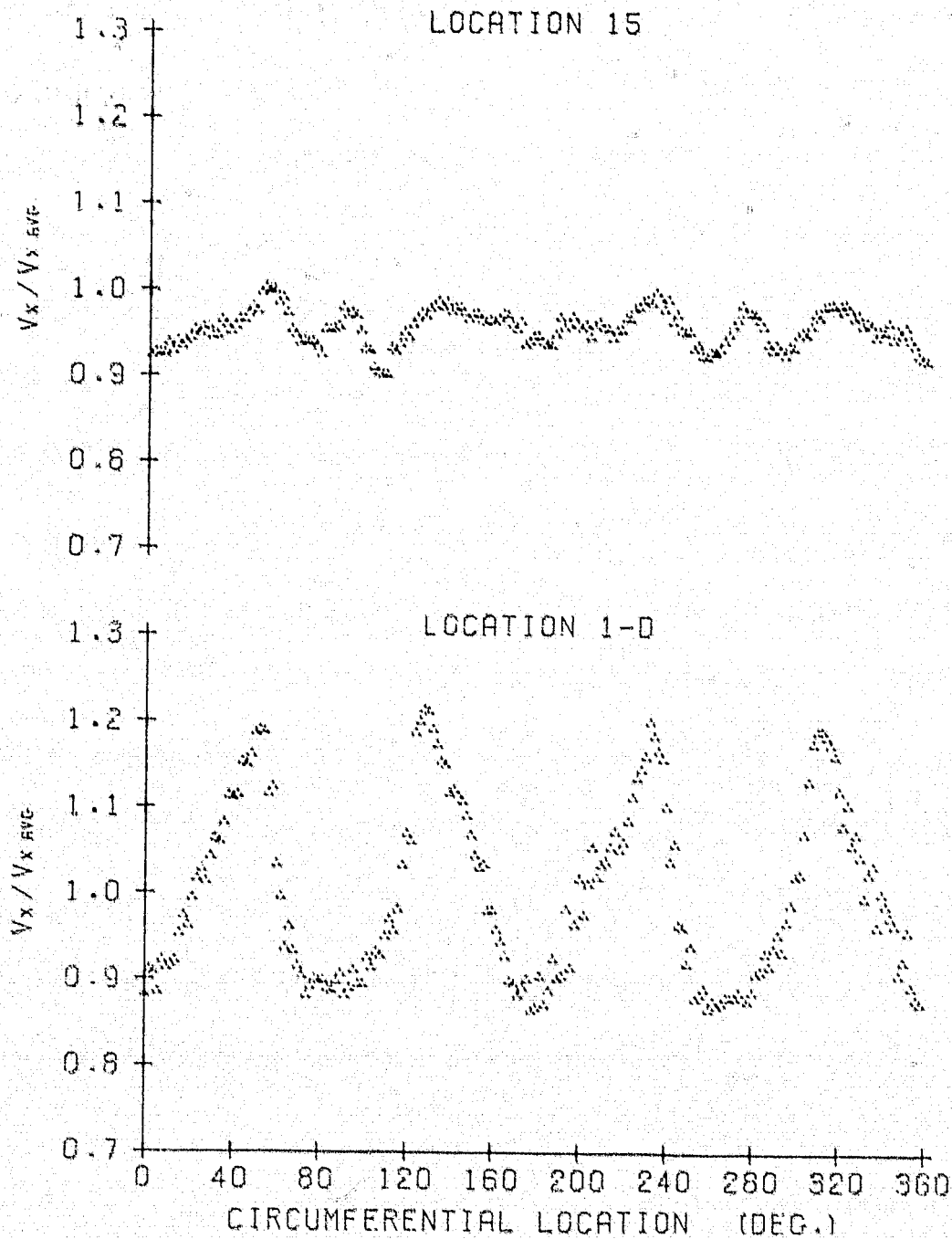


Figure D.61

10 October 1978
LCB:jep

9 BLADES
80 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM - 1798

AVG. FLOW COEFF. = 0.492
AVG. P-RISE COEF. = 2.951
AVG. INCIDENCE = 7.50 DEG.

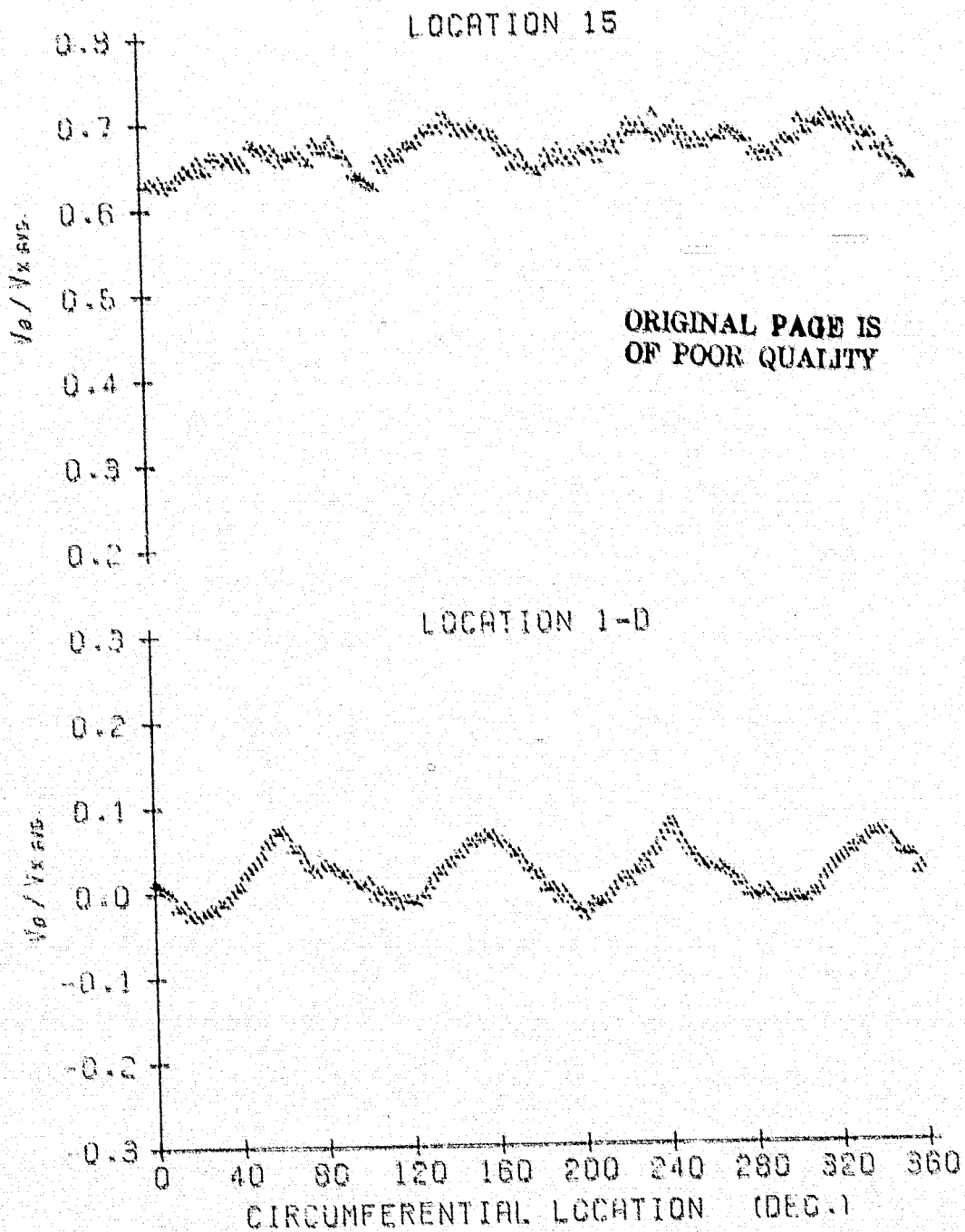


Figure D.62

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1798

AVG. FLOW COEF. = 0.492
AVG. P-RISE COEF. = 2.951
AVG. INCIDENCE = 7.50 DEG.

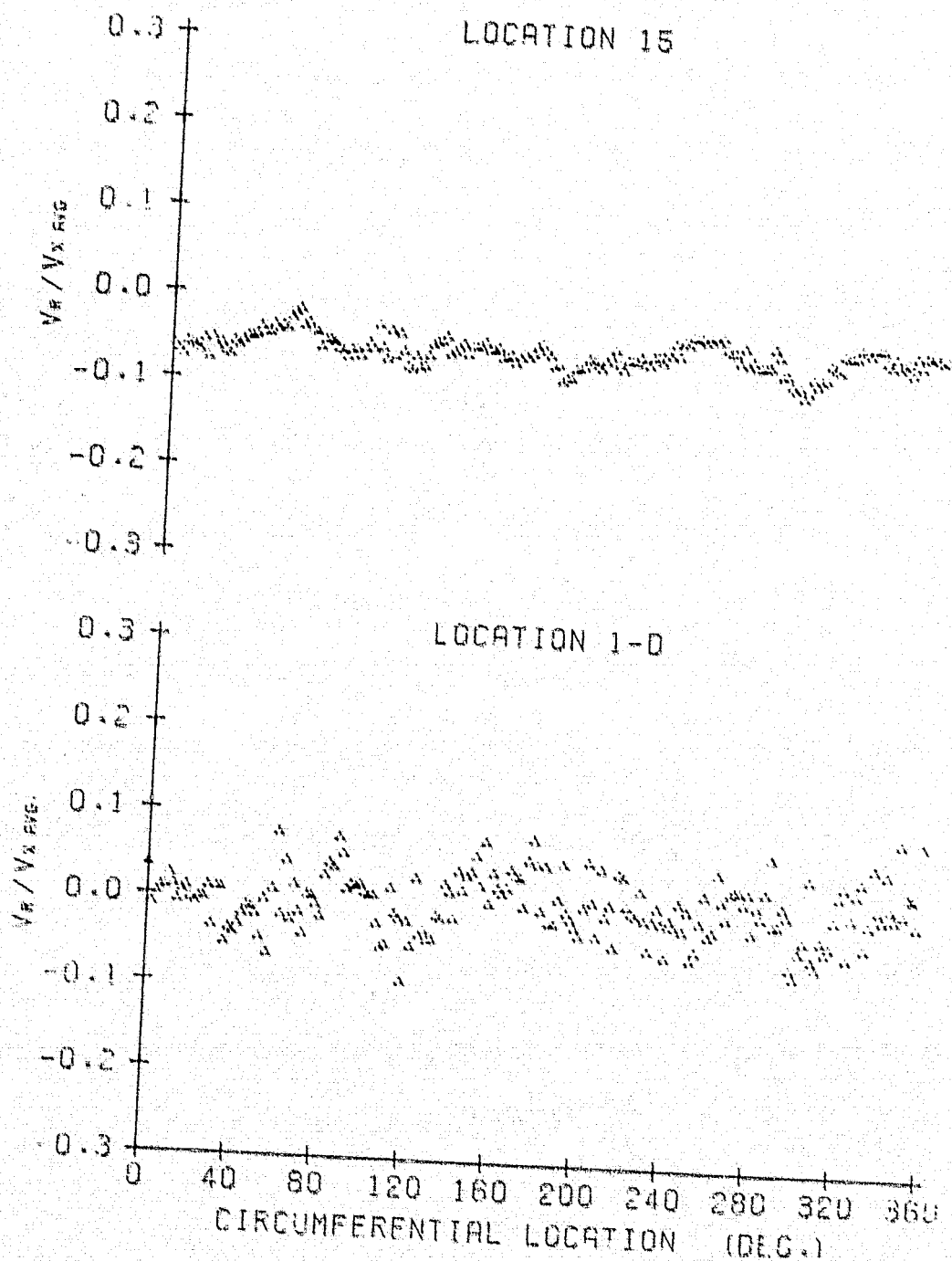


Figure D.63

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1798

AVG. FLOW COEF. = 0.492
AVG. P-RISE COEF. = 2.951
AVG. INCIDENCE = 7.50 DEG.

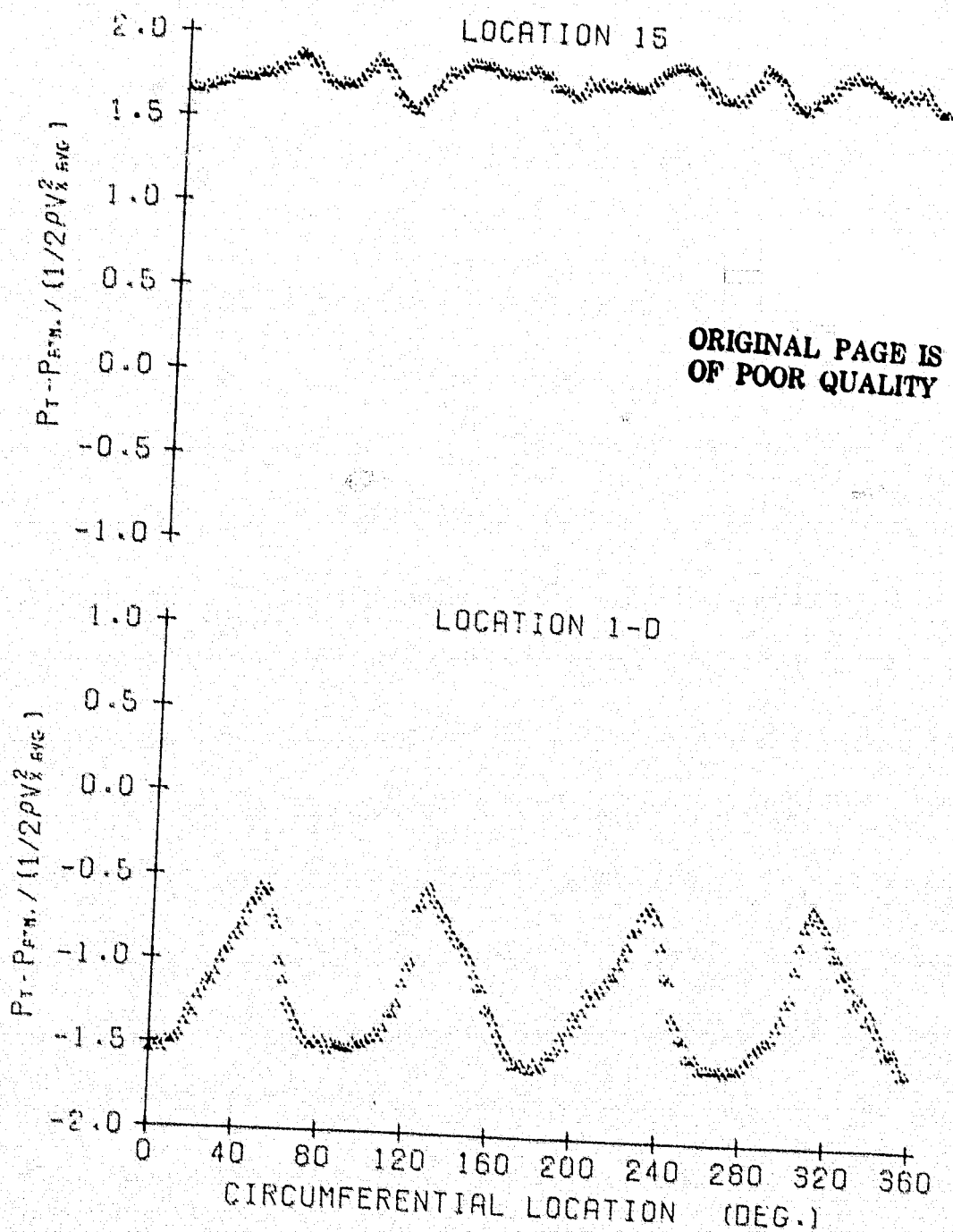


Figure D.64

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1798

AVG. FLOW COEFF. = 0.492
AVG. P-RISE COEFF. = 2.951
AVG. INCIDENCE = 7.50 DEG.

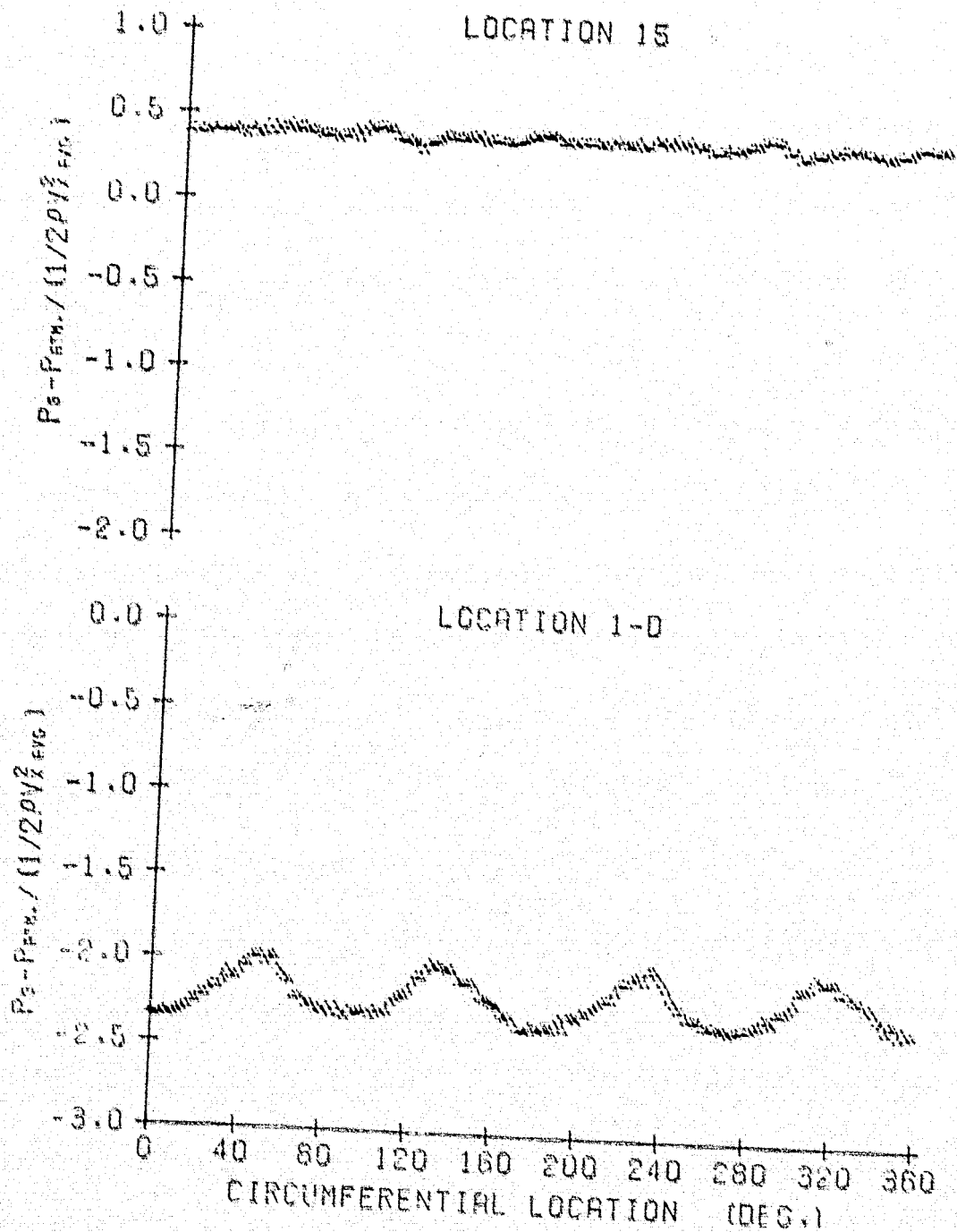


Figure D.65

10 October 1978
LCB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1798

AVG. FLOW COEF. = 0.492
AVG. P-RISE COEF. = 2.951
AVG. INCIDENCE = 7.50 DEG.

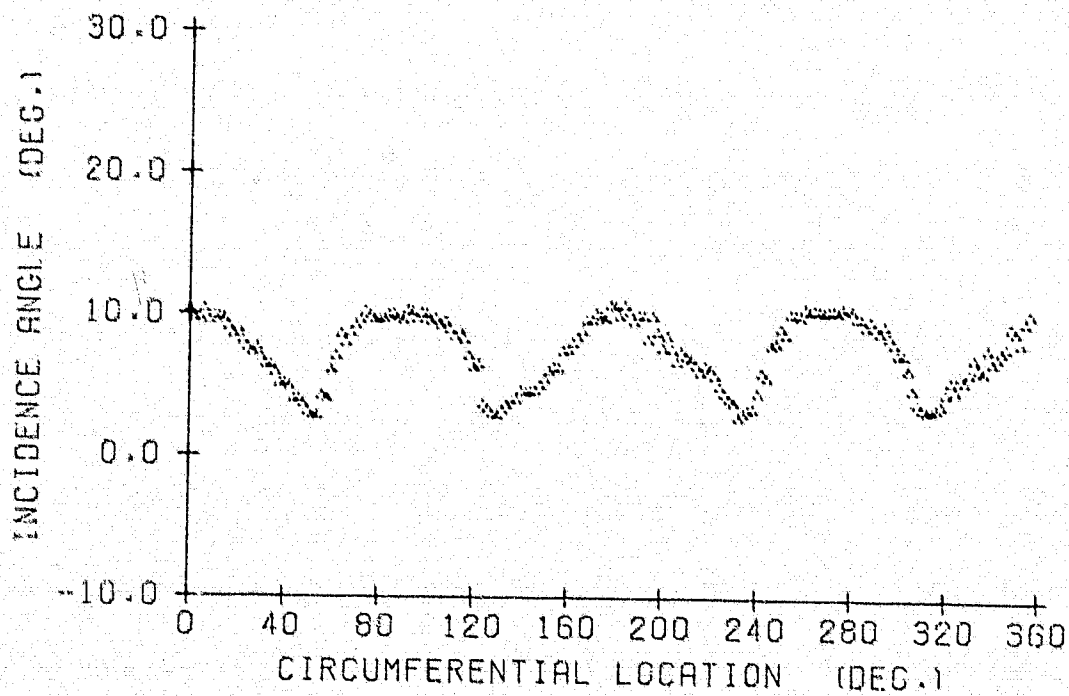


Figure D.66

10 October 1978
LGB:jep

3 BLADES
60 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM = 1492

AVG. FLOW COEF. = 0.610
AVG. P-RISE COEF. = 1.356
AVG. INCIDENCE = 2.41 DEG.

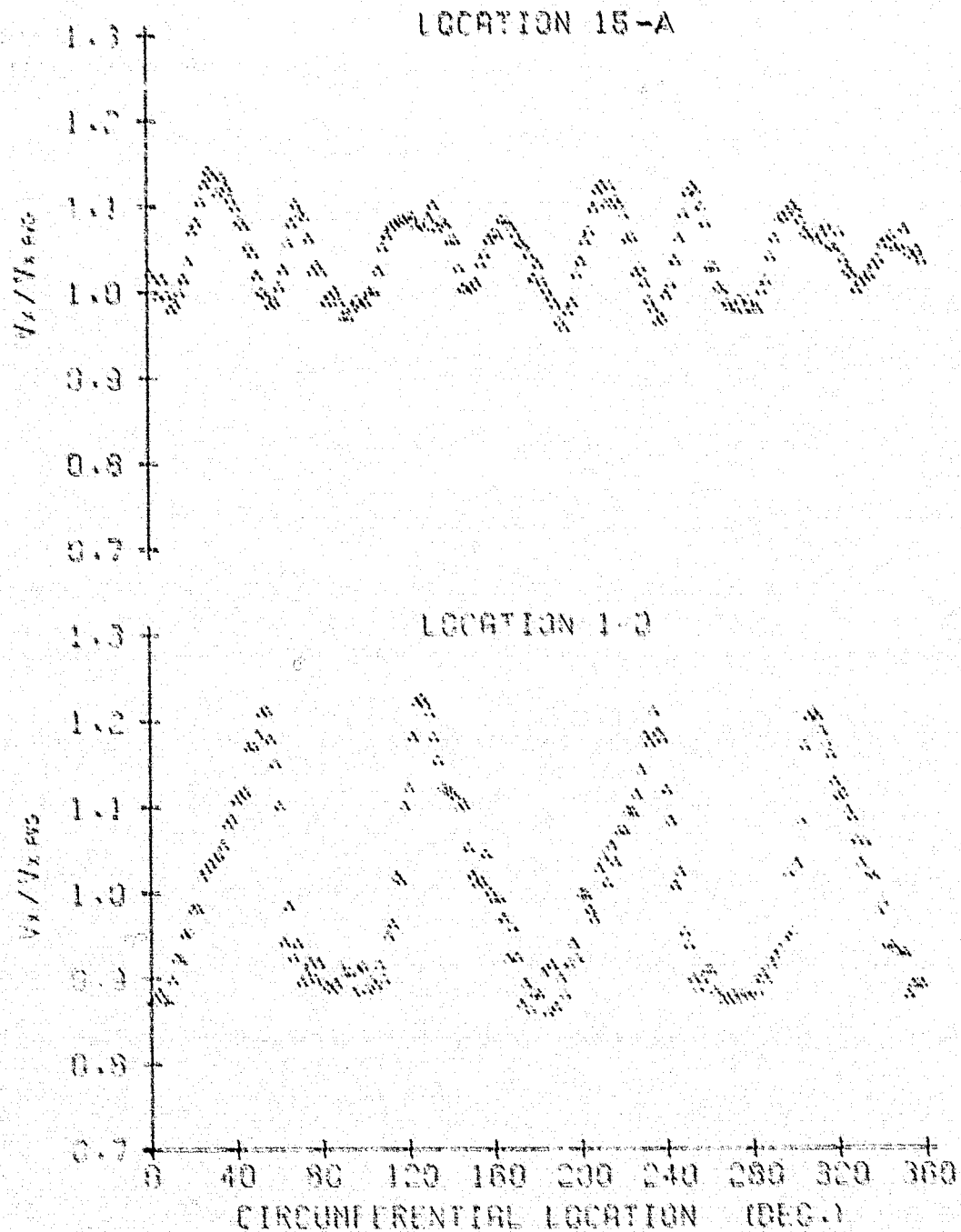


Figure D.67

10 October 1978

LGB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1492

AVG. FLOW COEF. = 0.610
AVG. P-RISE COEF. = 1.356
AVG. INCIDENCE = 2.41 DEG.

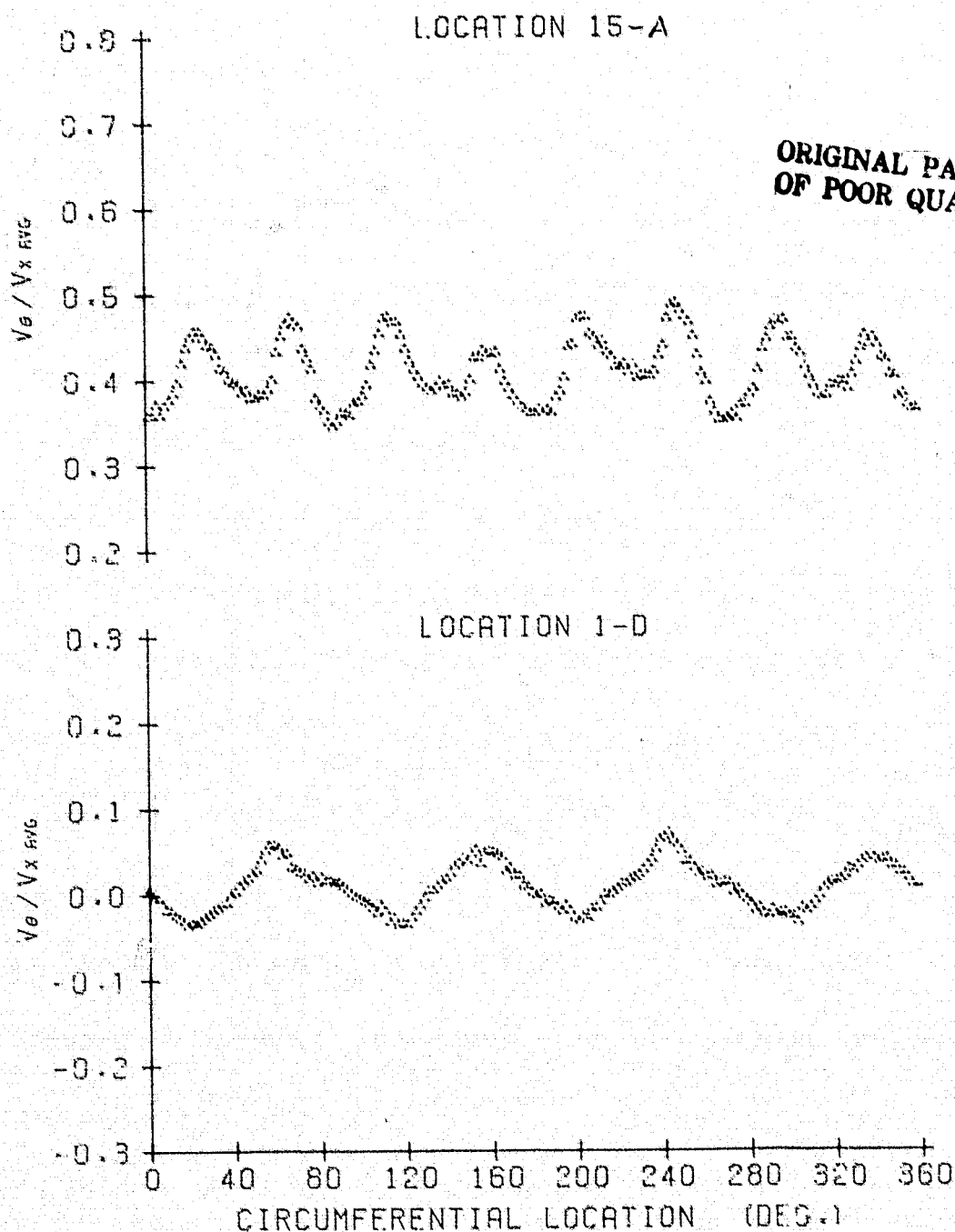


Figure D.68

10 October 1978
LGB:jep

2 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1492

AVG. FLOW COEF. = 0.610
AVG. P-RISE COEF. = 1.356
AVG. INCIDENCE = 2.41 DEG.

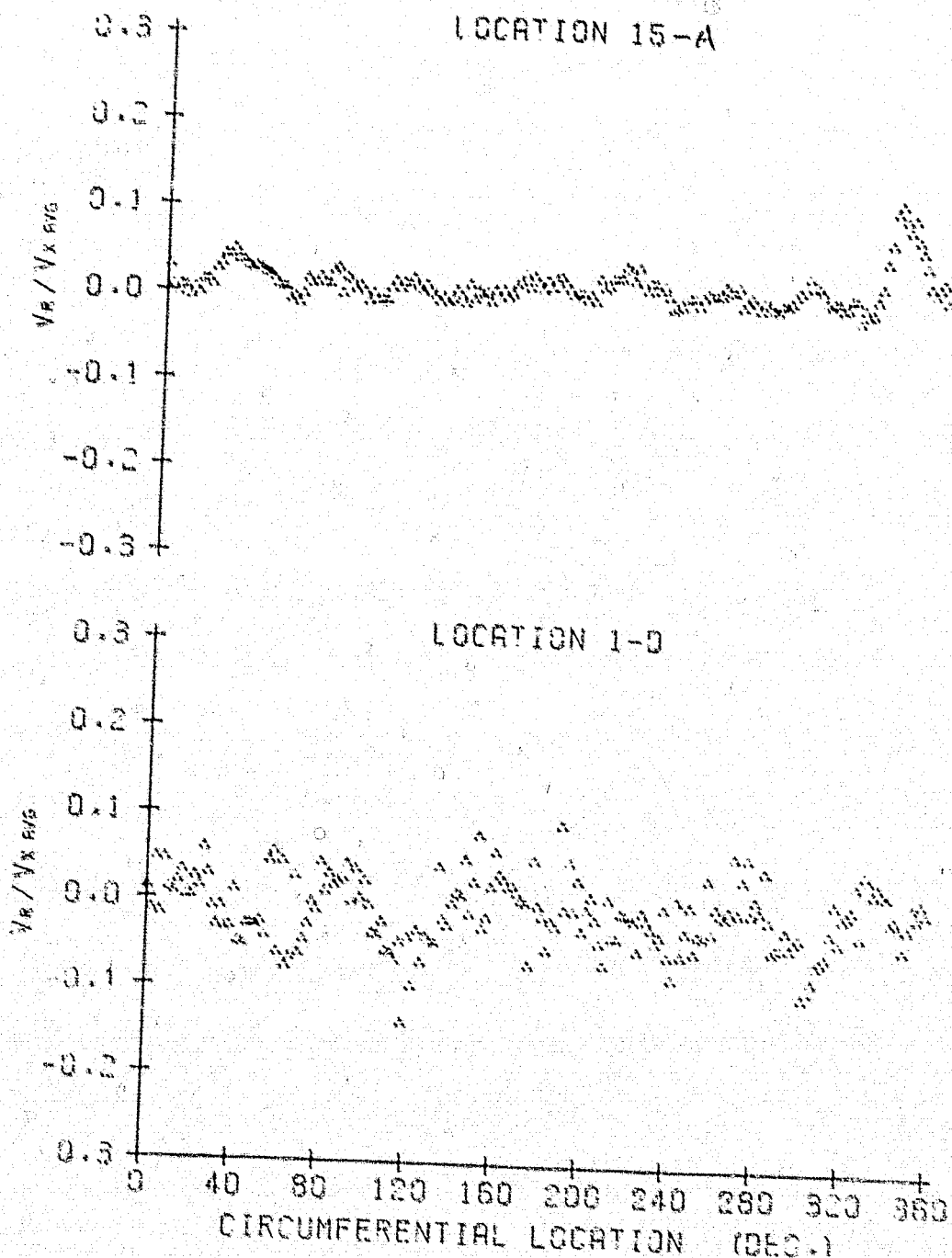


Figure D.69

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1492

AVG. FLOW COEF. = 0.610
AVG. P-RISE COEF. = 1.356
AVG. INCIDENCE = 2.41 DEG.

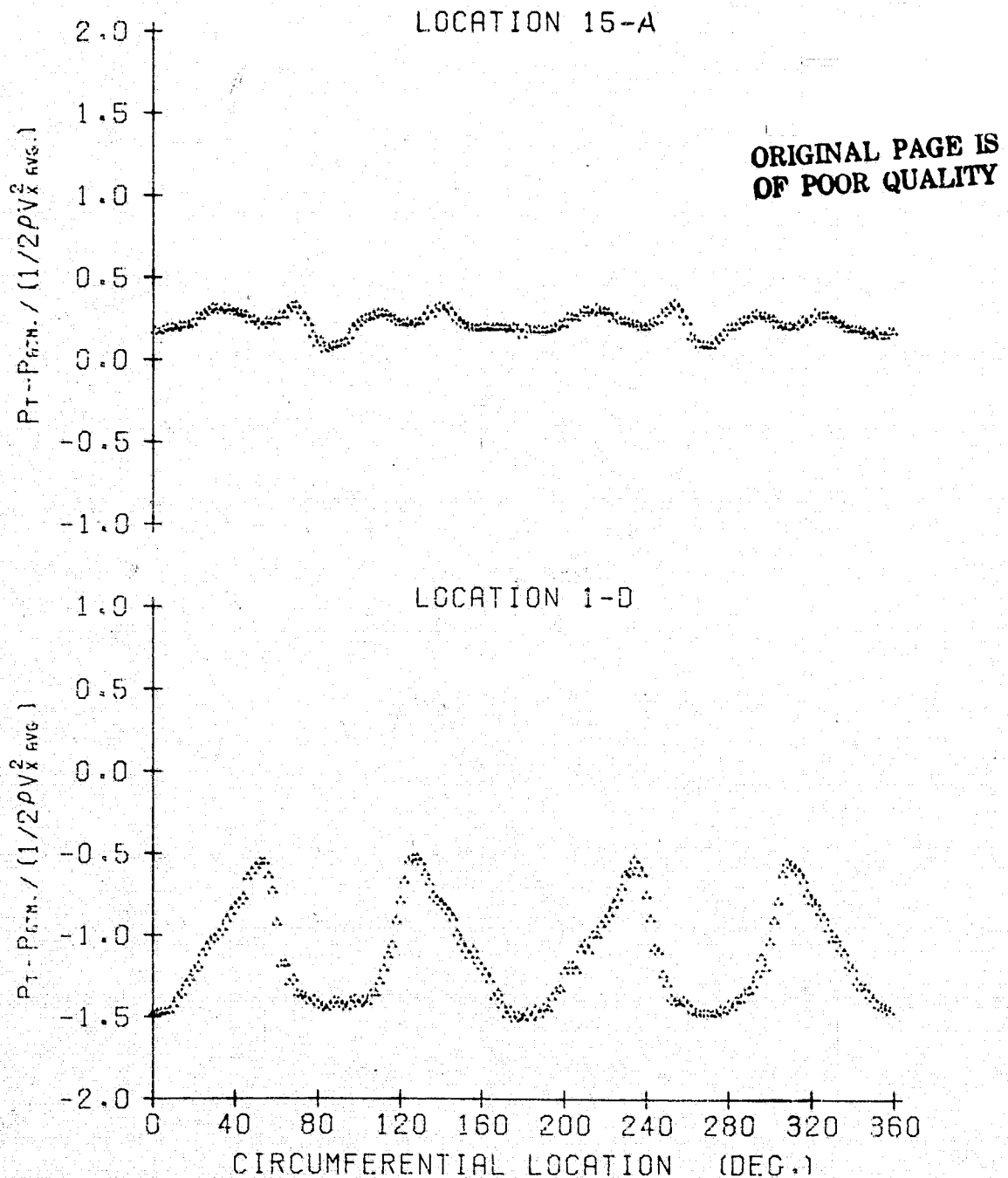


Figure D.70

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1492

AVG. FLOW COEF. = 0.610
AVG. P-RISE COEF. = 1.356
AVG. INCIDENCE = 2.41 DEG.

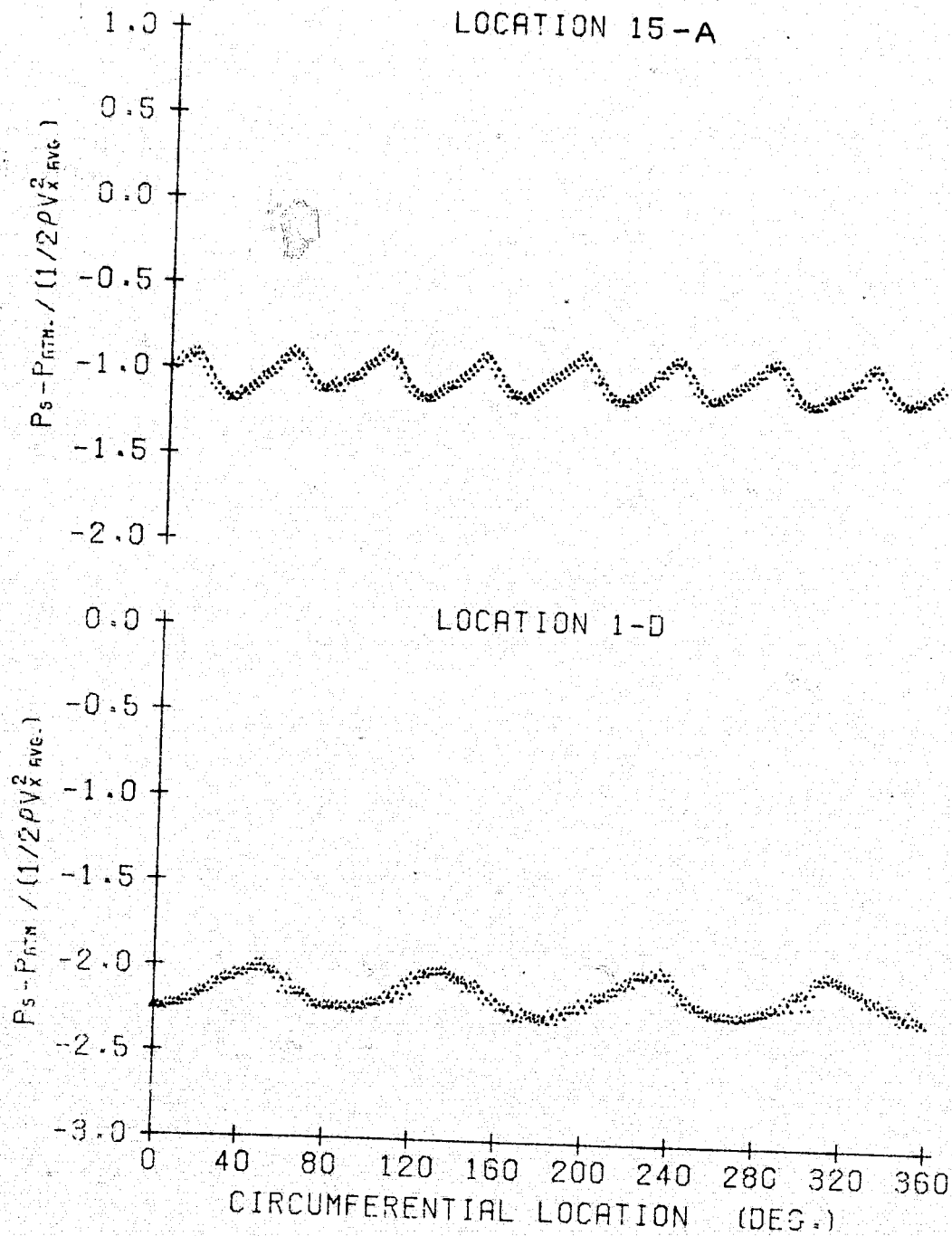


Figure D.71

10 October 1978
LGB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1492

AVG. FLOW COEF. = 0.610
AVG. P-RISE COEF. = 1.356
AVG. INCIDENCE = 2.41 DEG.

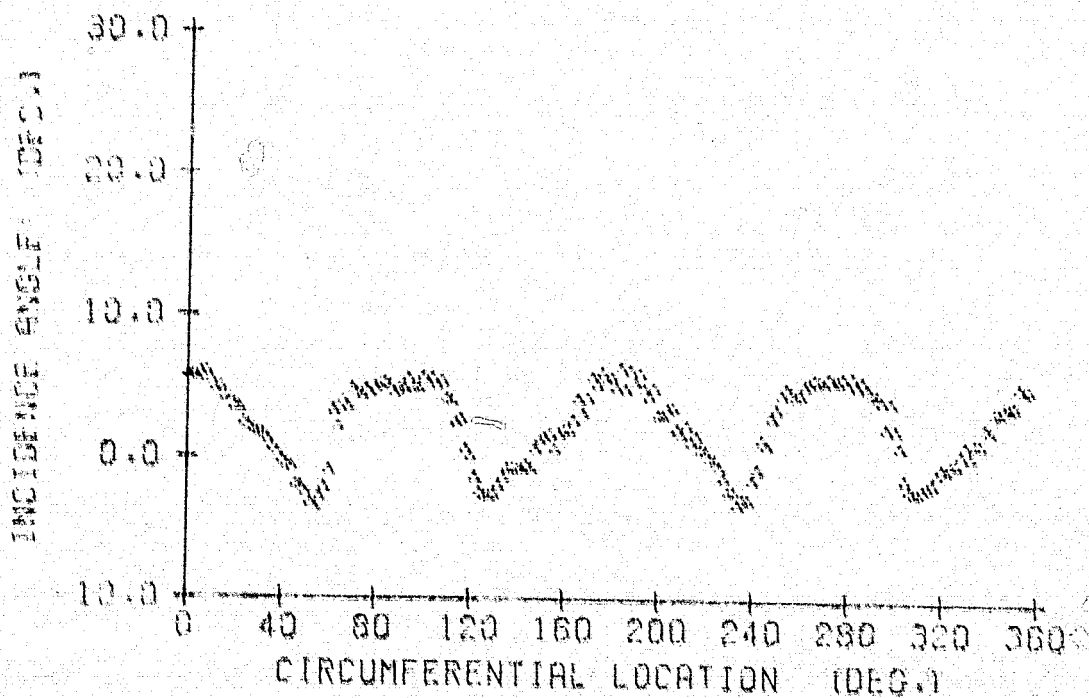


Figure D.72

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1663

AVG. FLOW COEFF. = 0.534
AVG. P-RISE COEFF. = 2.252
AVG. INCIDENCE = 5.70 DEG.

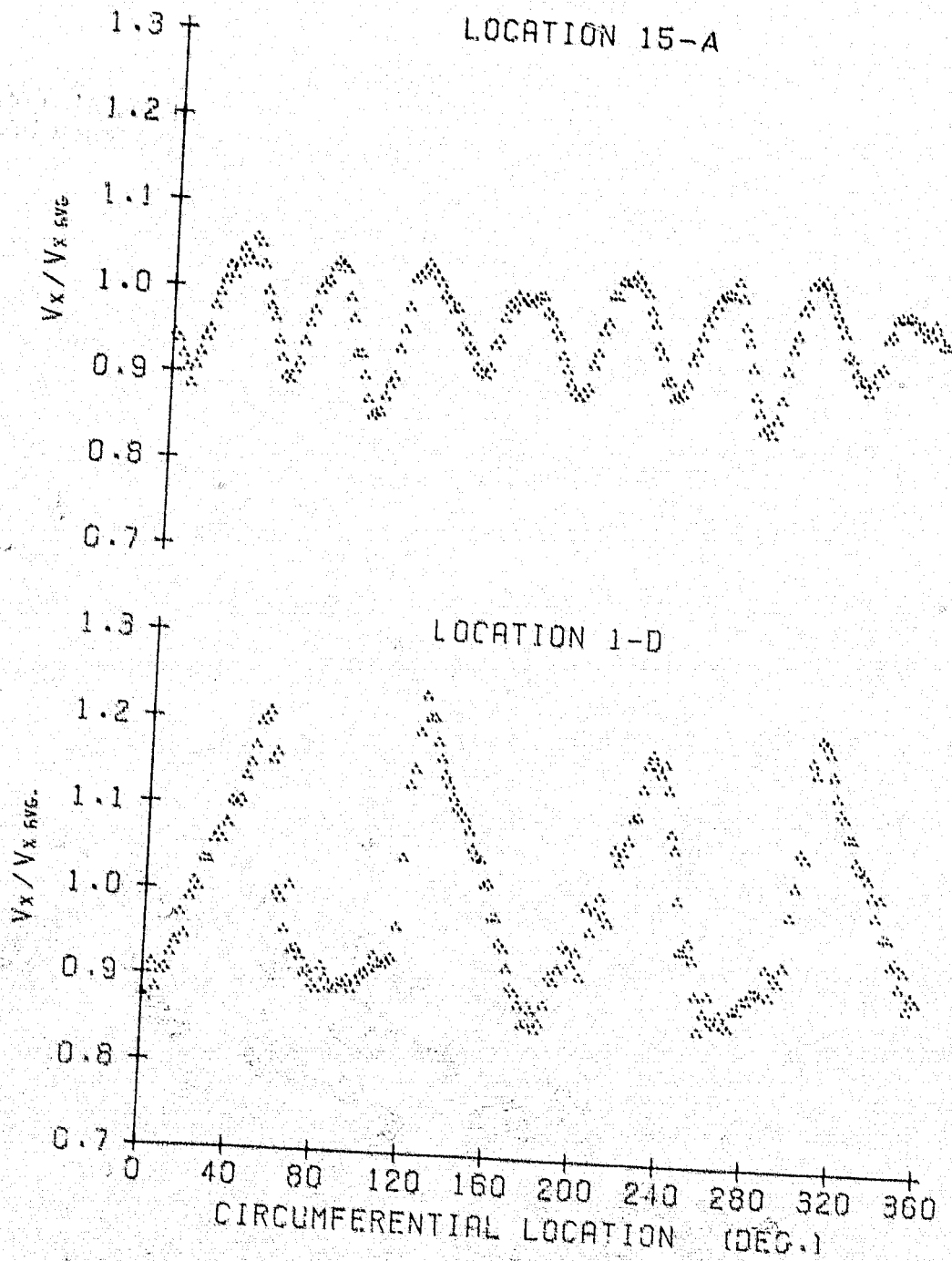


Figure D.73

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1663

AVG. FLOW COEF. = 0.534
AVG. P-RISE COEF. = 2.252
AVG. INCIDENCE = 5.70 DEG.

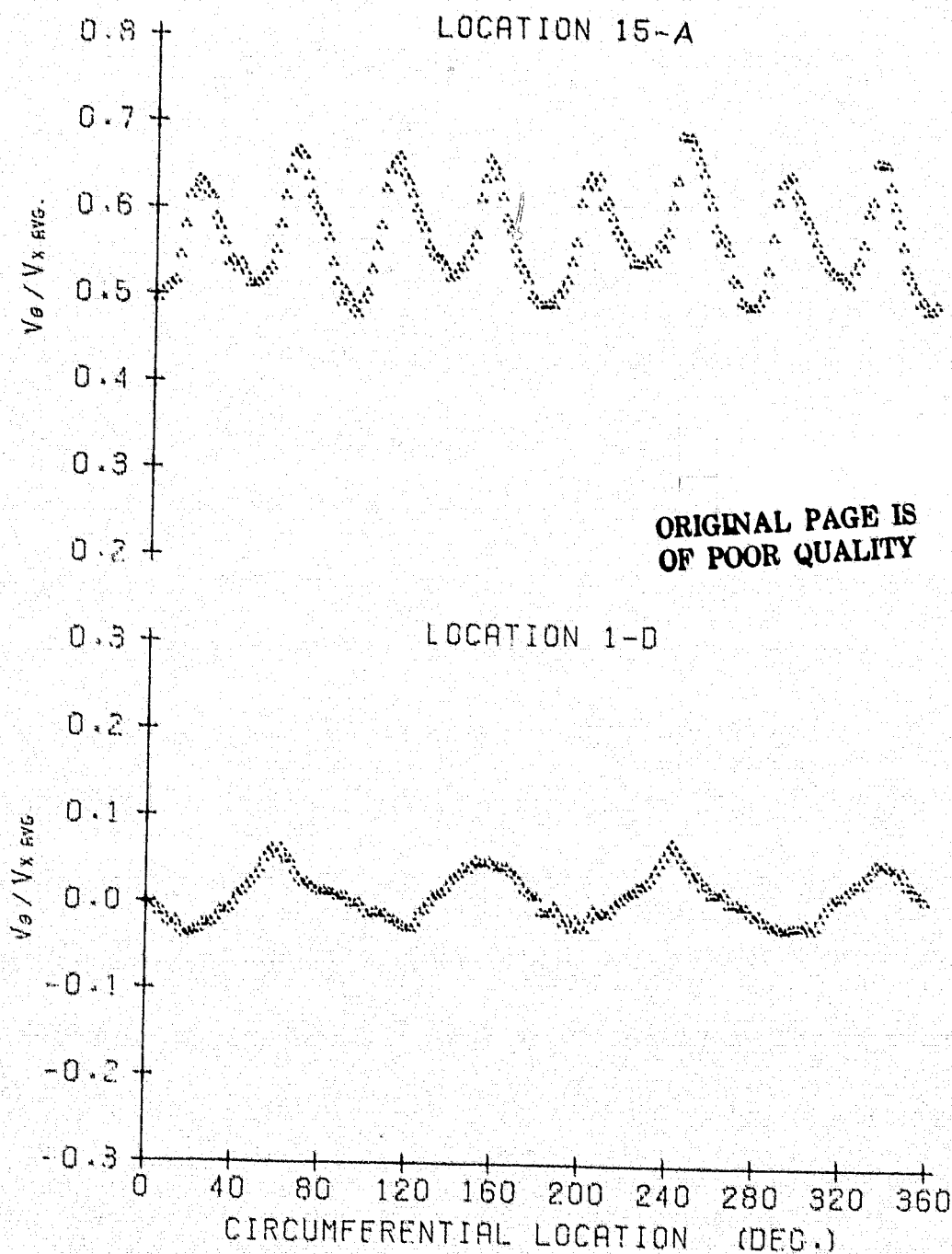


Figure D.74

10 October 1978

LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1663

AVG. FLOW COEF. = 0.534
AVG. P-RISE COEF. = 2.252
AVG. INCIDENCE = 5.70 DEG.

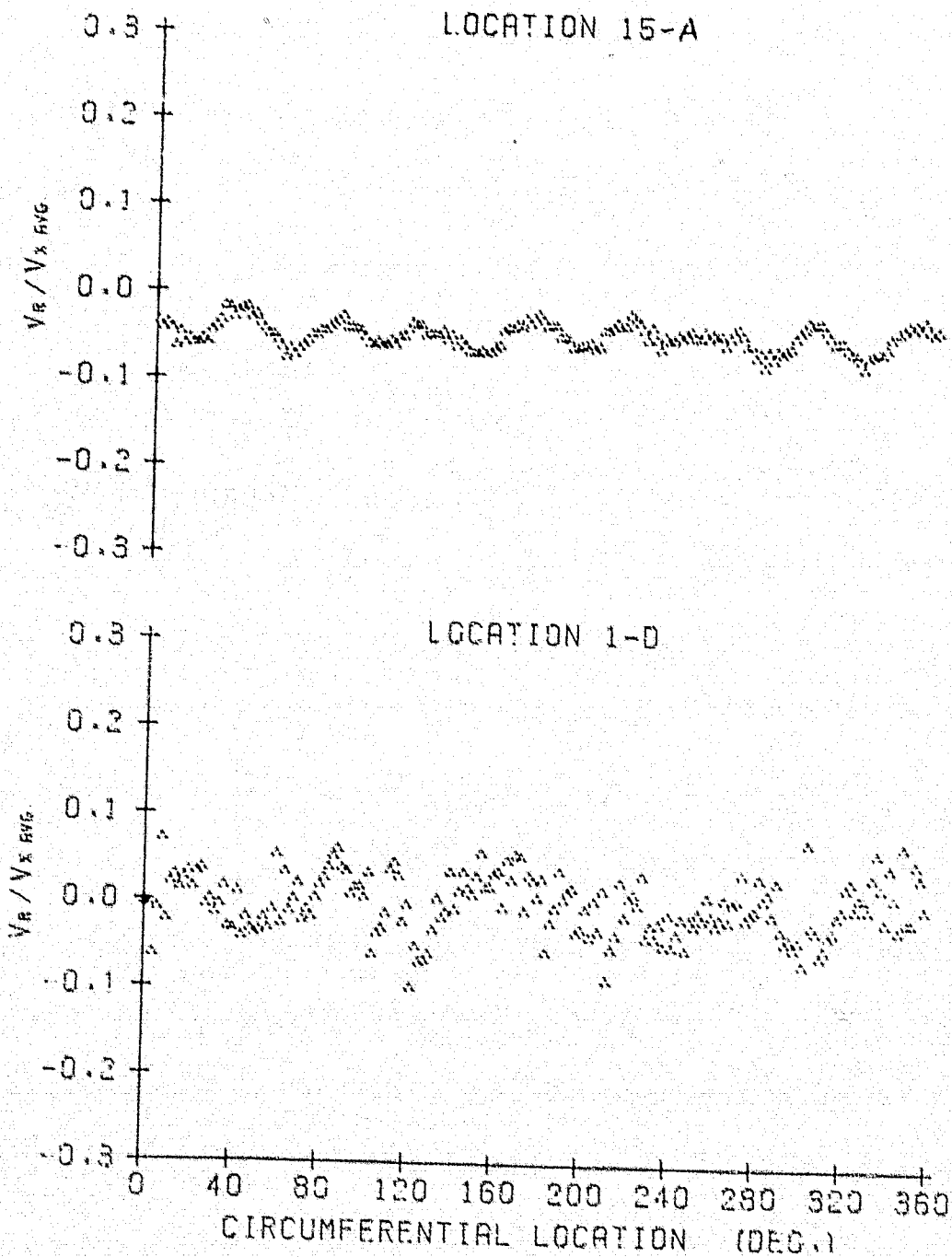


Figure D.75

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1663

AVG. FLOW COEF. = 0.534
AVG. P-RISE COEF. = 2.252
AVG. INCIDENCE = 5.70 DEG.

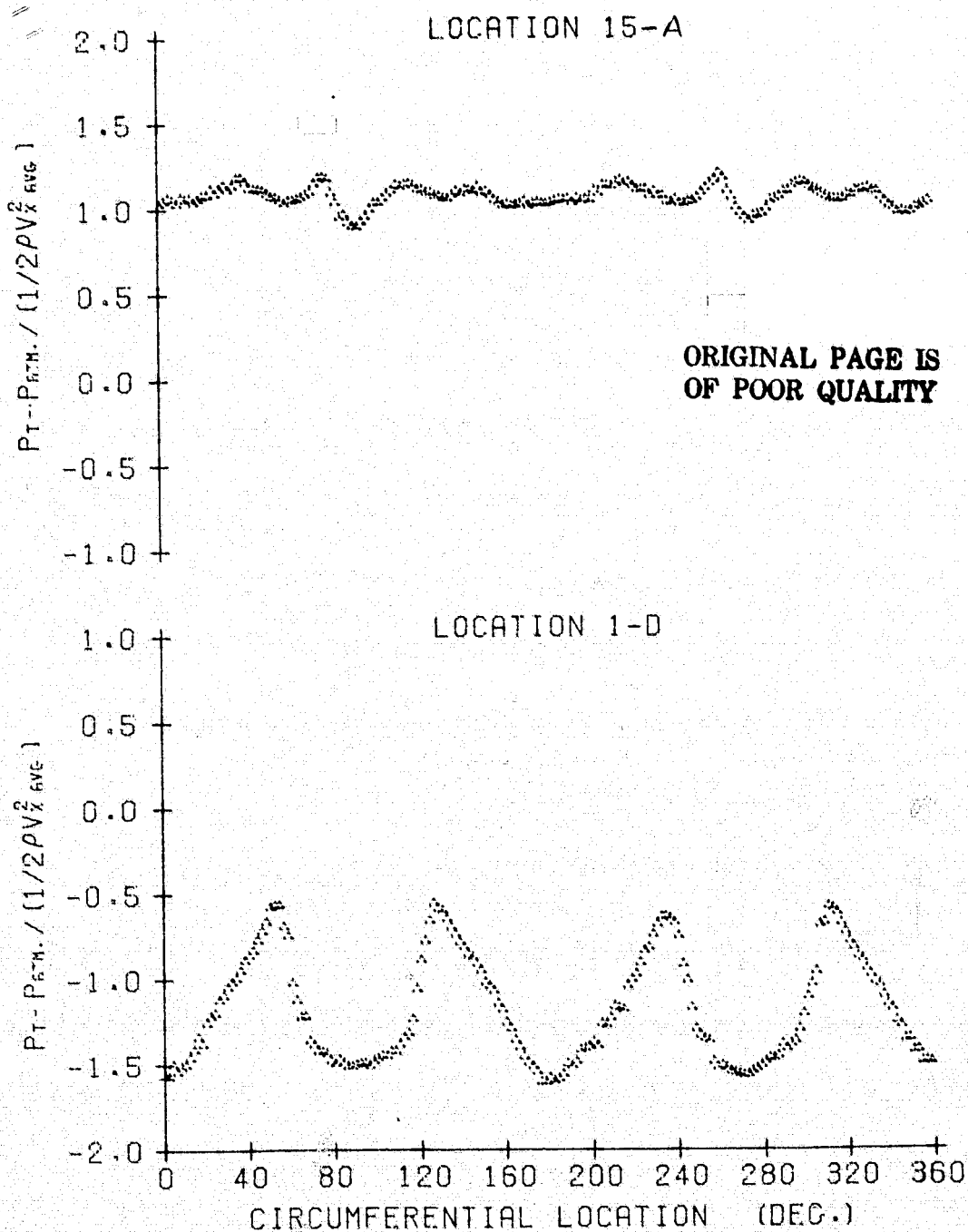


Figure D.76

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1663

AVG. FLOW COEFF. = 0.534
AVG. P-RISE COEFF. = 2.252
AVG. INCIDENCE = 5.70 DEG.

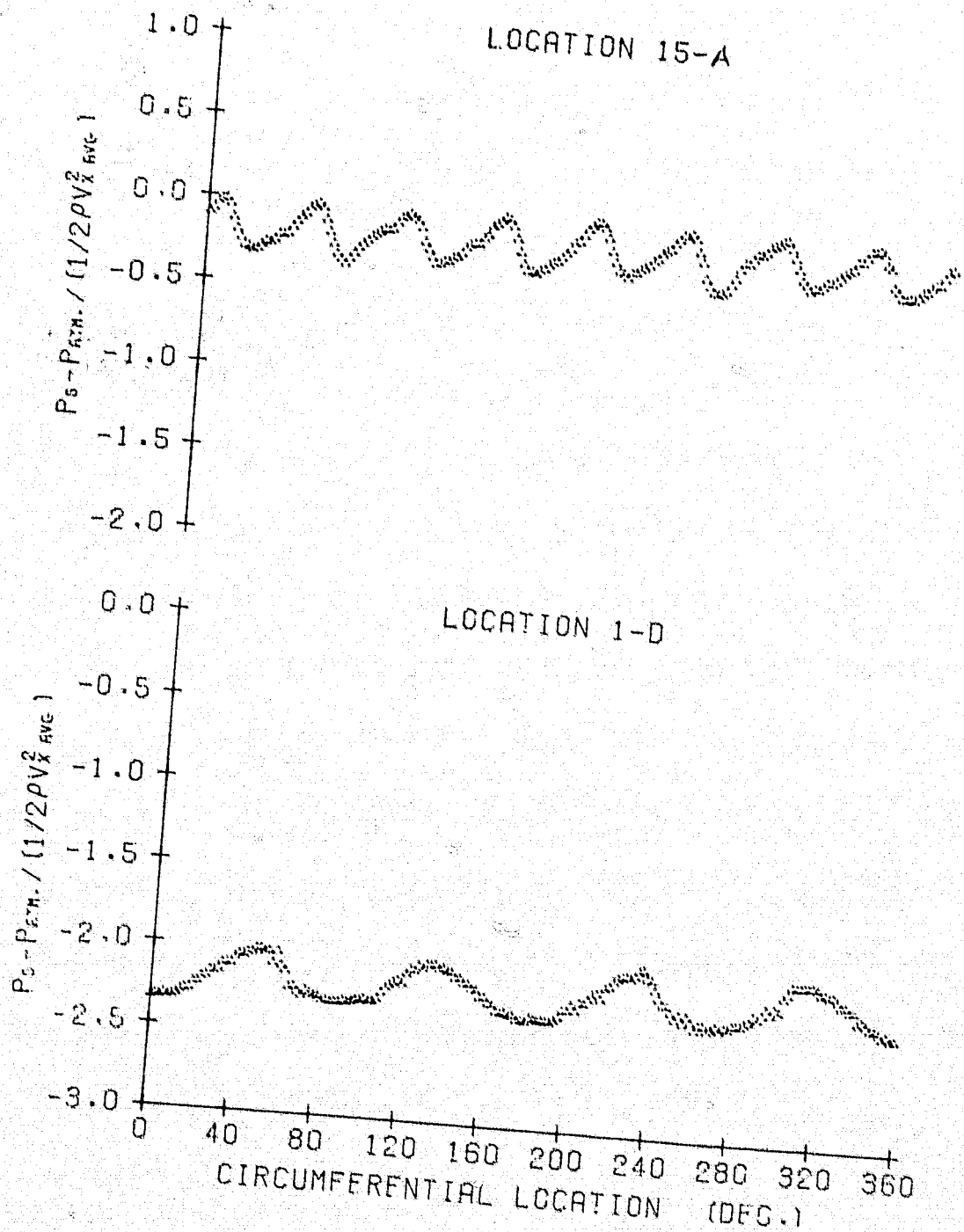


Figure D.77

10 October 1978
LCB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1663

AVG. FLOW COEF. = 0.534
AVG. P-RISE COEF. = 2.252
AVG. INCIDENCE = 5.70 DEG.

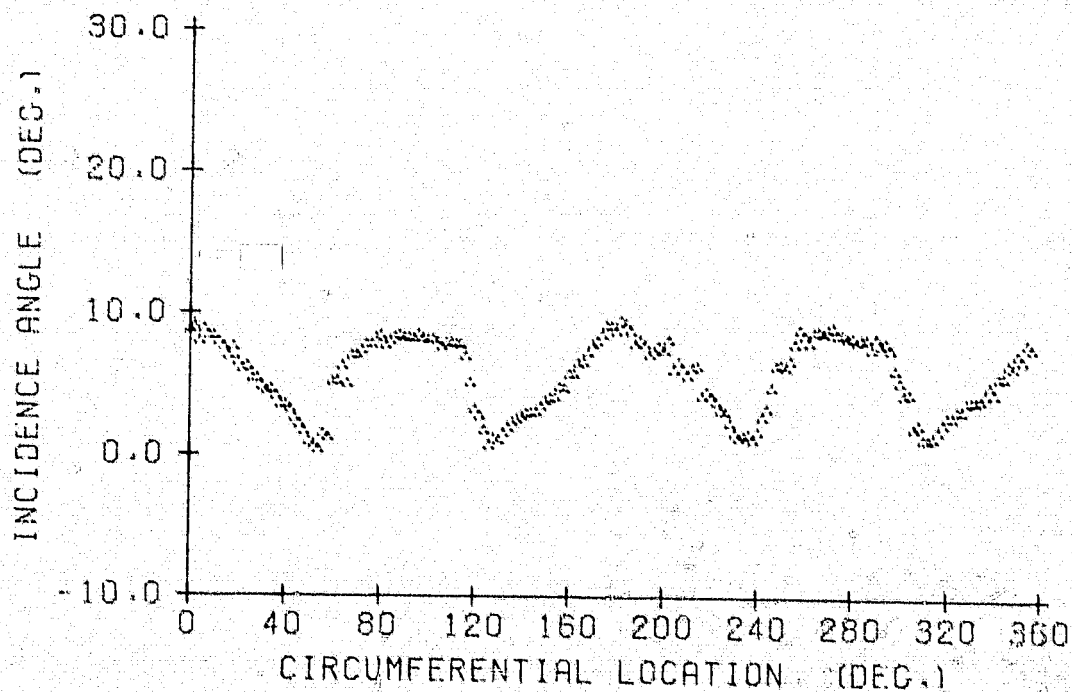


Figure D.78

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1798

AVG. FLOW COEF. = 0.489
AVG. P-RISE COEF. = 2.968
AVG. INCIDENCE = 7.74 DEG.

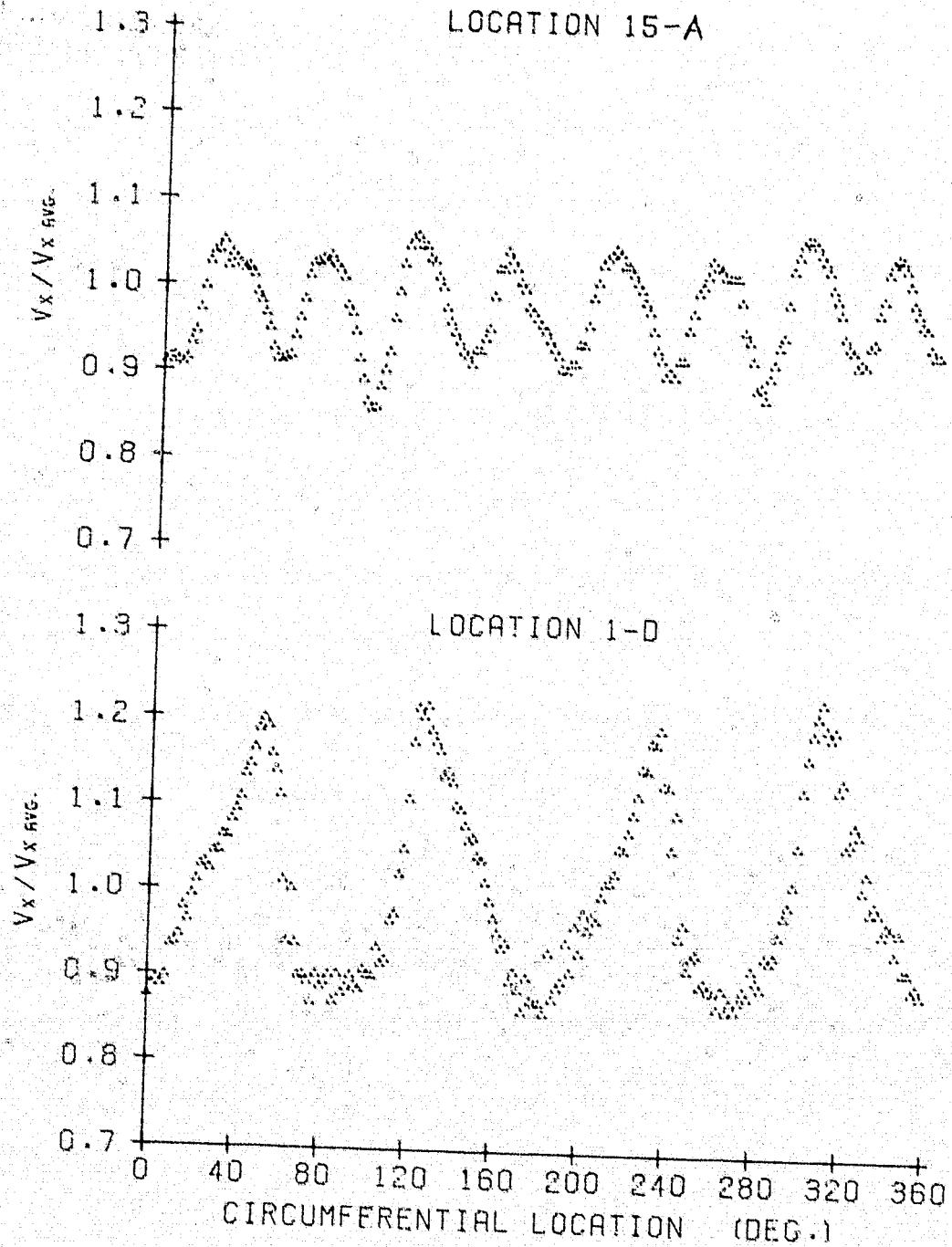


Figure D.79

10 October 1978

LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1798

AVG. FLOW COEF. = 0.489
AVG. P-RISE COEF. = 2.968
AVG. INCIDENCE = 7.74 DEG.

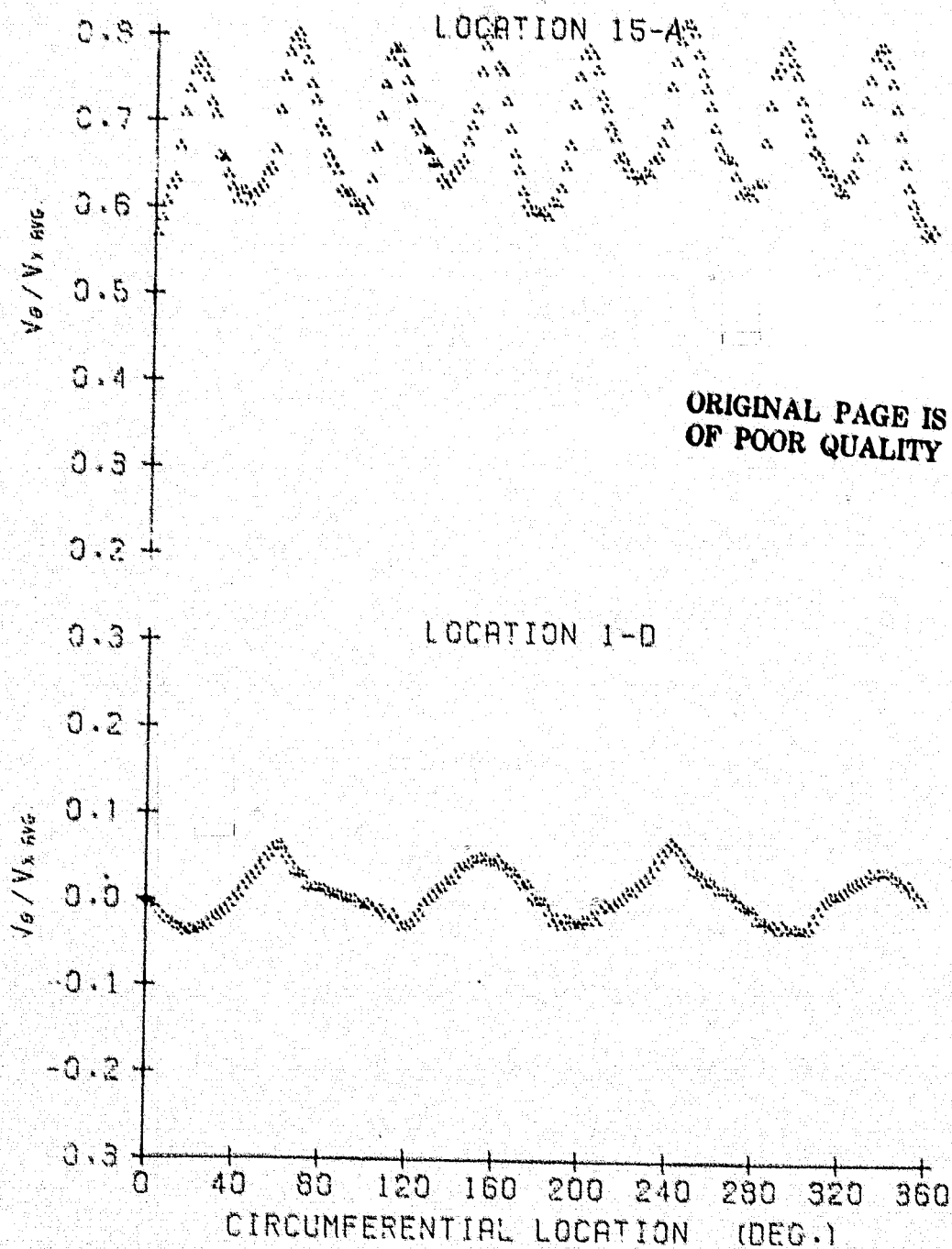


Figure D.80

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1798

AVG. FLOW COEF. = 0.489
AVG. P-RISE COEF. = 2.968
AVG. INCIDENCE = 7.74 DEG.

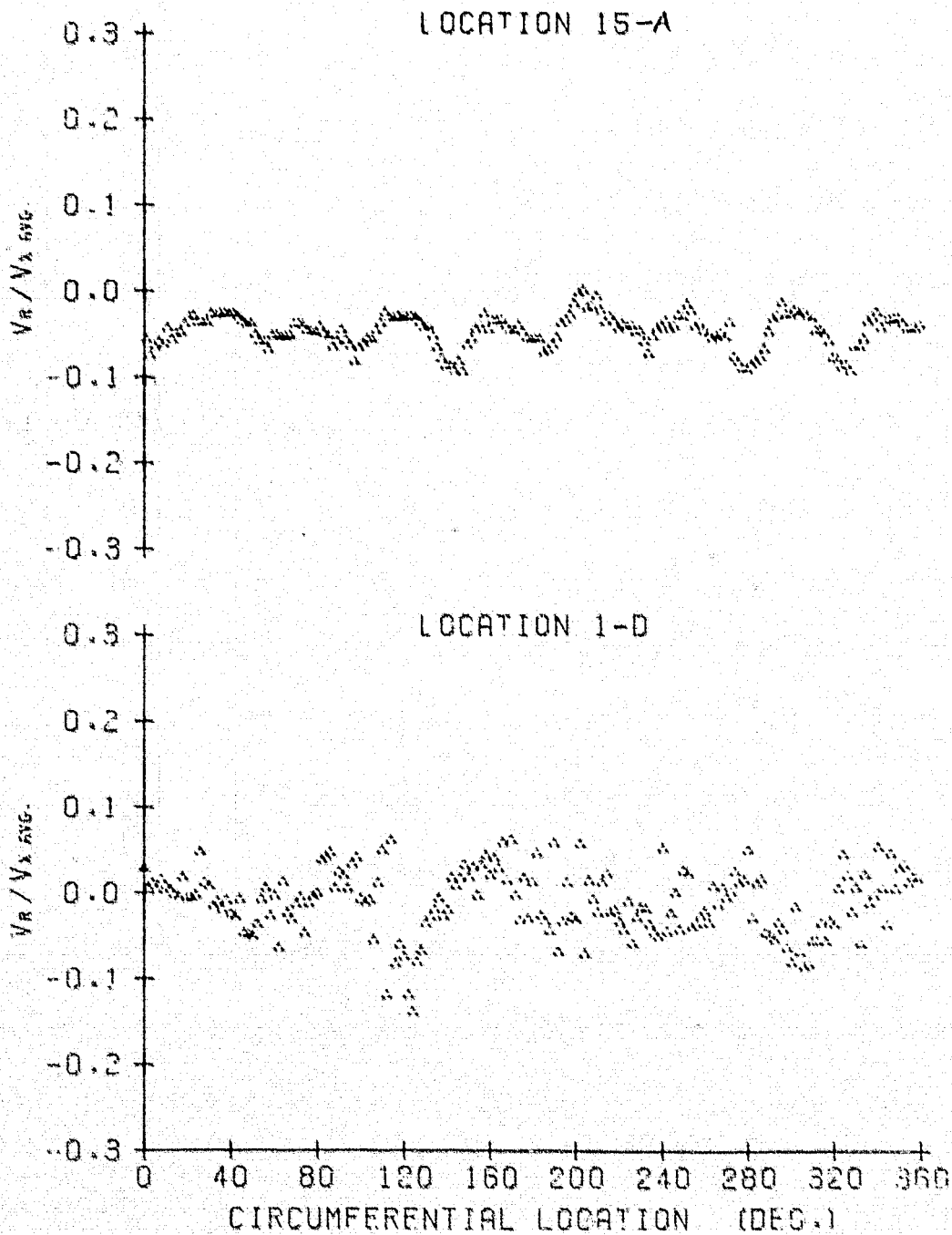
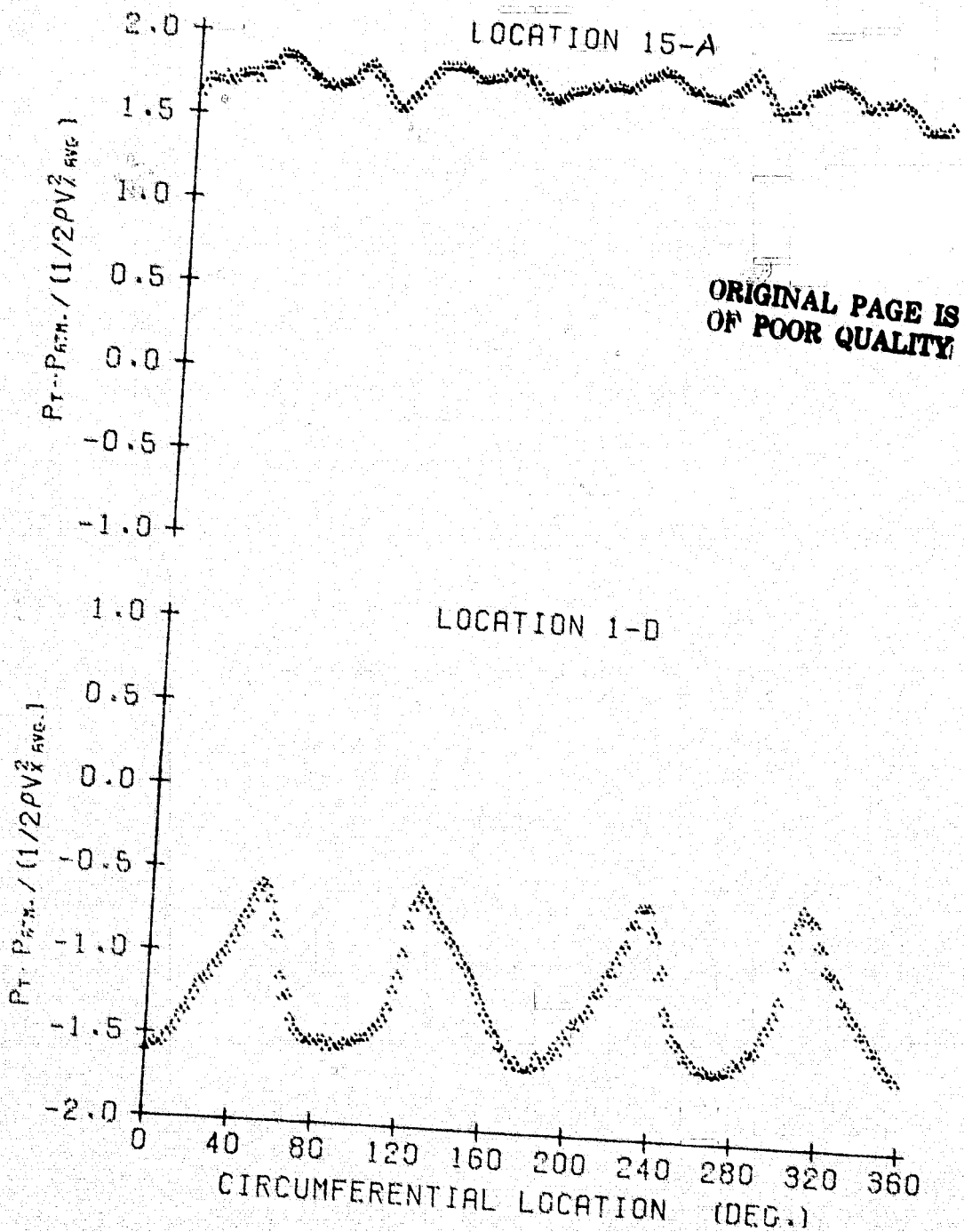


Figure D.81

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1798

AVG. FLOW COEF. = 0.489
AVG. P-RISE COEF. = 2.968
AVG. INCIDENCE = 7.74 DEG.



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Figure D.82

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1798

AVG. FLOW COEF. = 0.489
AVG. P-RISE COEF. = 2.968
AVG. INCIDENCE = 7.74 DEG.

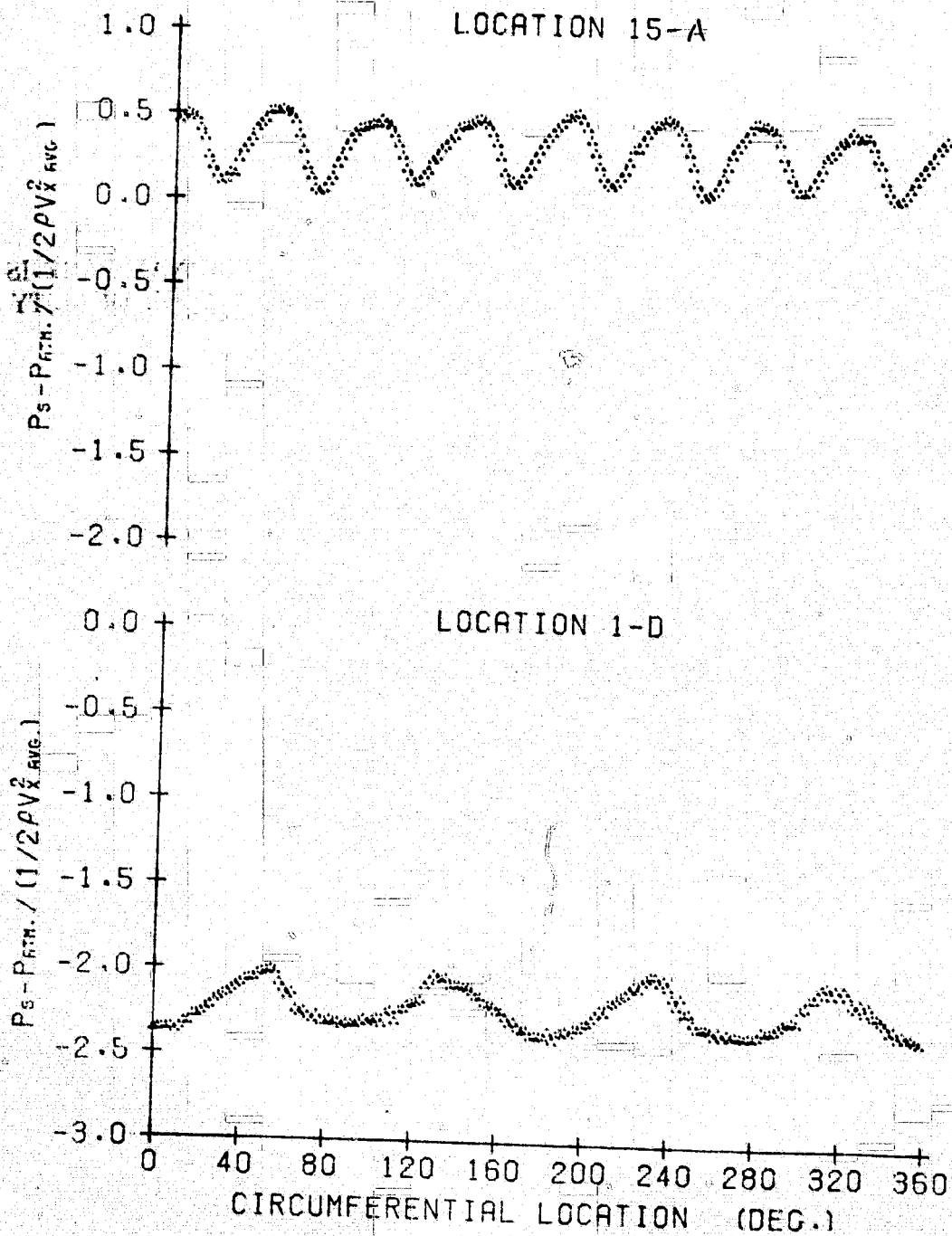


Figure D.83

10 October 1978
LCB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1798

AVG. FLOW COEF. = 0.489
AVG. P-RISE COEF. = 2.968
AVG. INCIDENCE = 7.74 DEG.

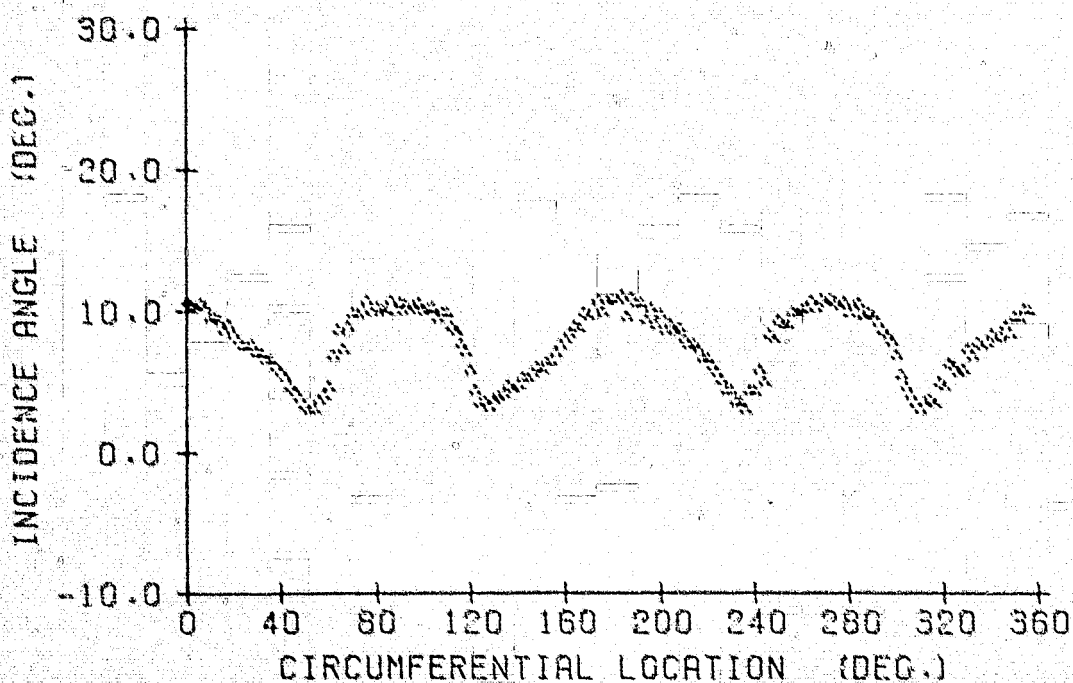


Figure D.84

10 October 1978

LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1663

AVG. FLOW COEF. = 0.534
AVG. P-RISE COEF. = 2.313
AVG. INCIDENCE = 5.77 DEG.

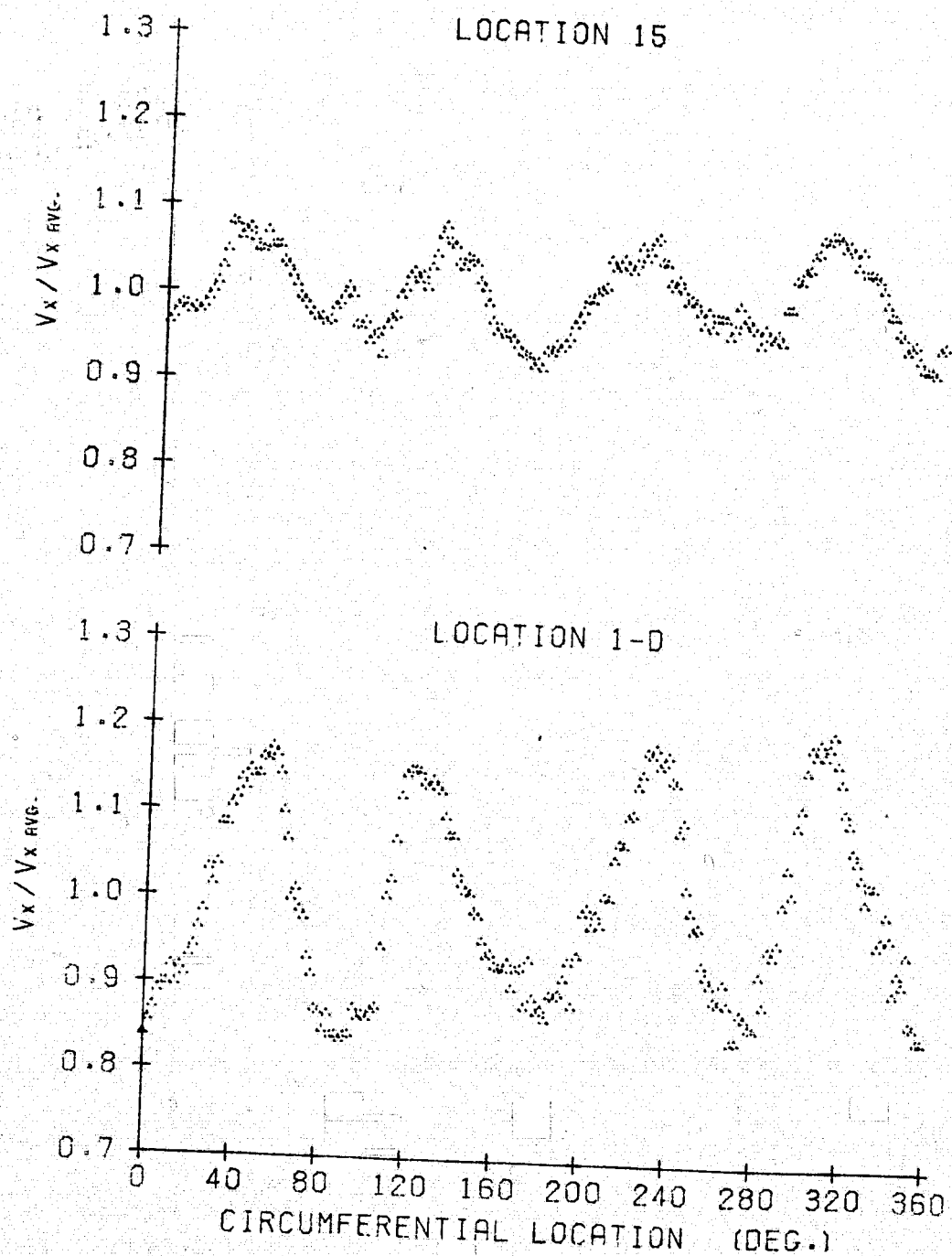


Figure D.85

10 October 1978
LJB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1663

AVG. FLOW COEF. = 0.534
AVG. P-RISE COEF. = 2.313
AVG. INCIDENCE = 5.77 DEG.

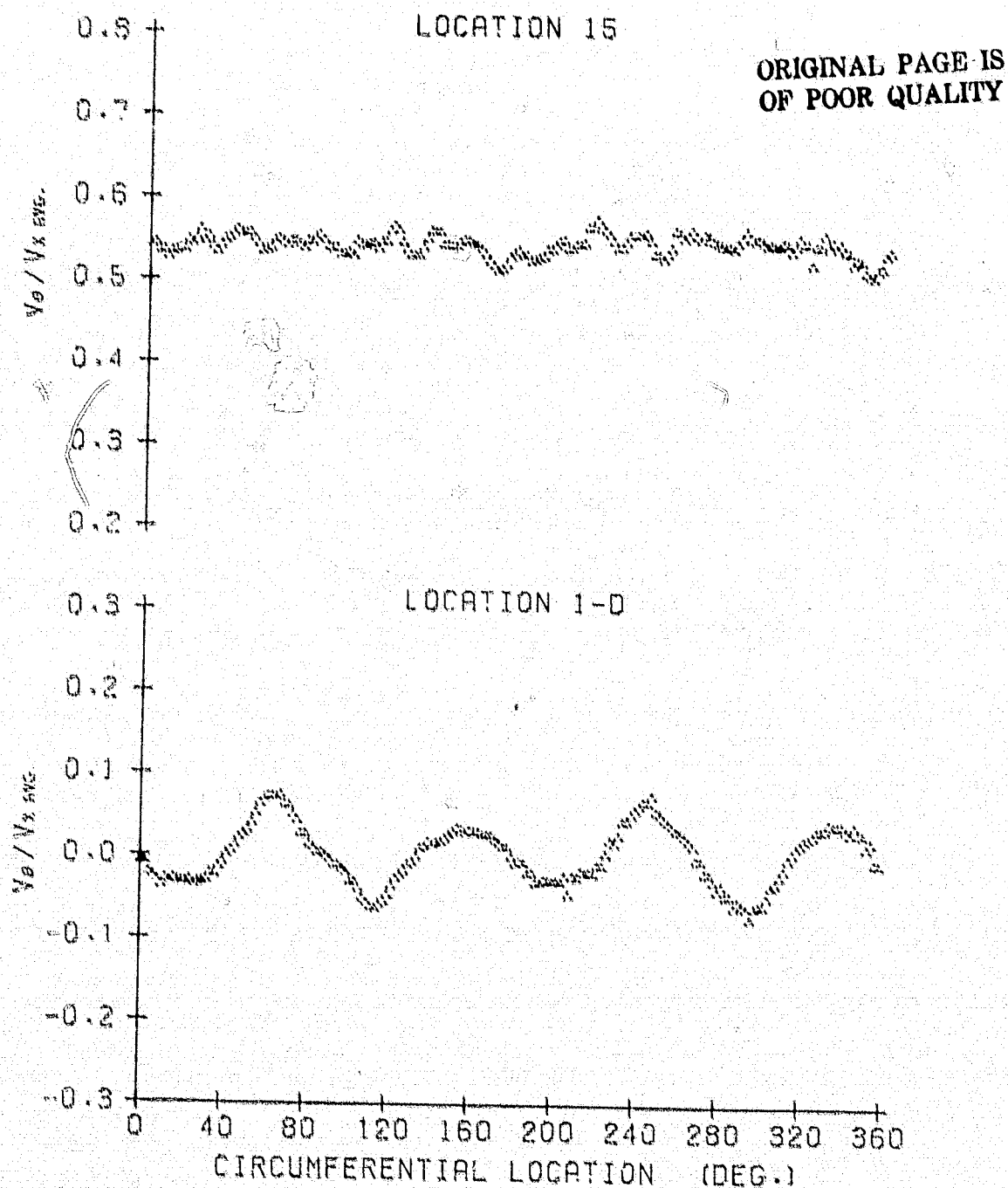


Figure D.86

-220-

10 October 1978

LCH:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1668

AVG. FLOW COEF. = 0.534
AVG. P-RISE COEF. = 2.313
AVG. INCIDENCE = 5.77 DEG.

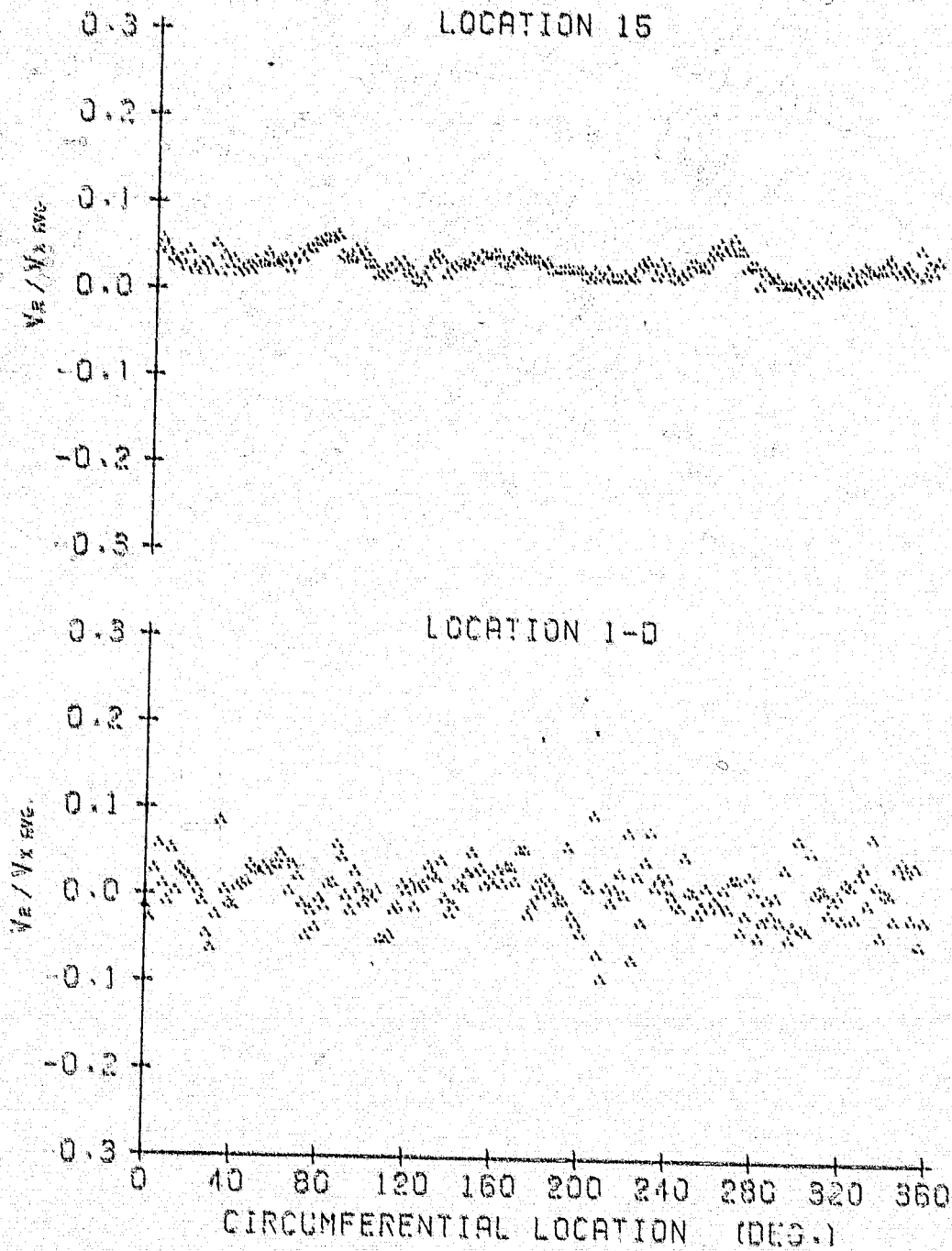


Figure D.87

10 October 1978

LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1663

AVG. FLOW COEF. = 0.534
AVG. P-RISE COEF. = 2.313
AVG. INCIDENCE = 5.77 DEG.

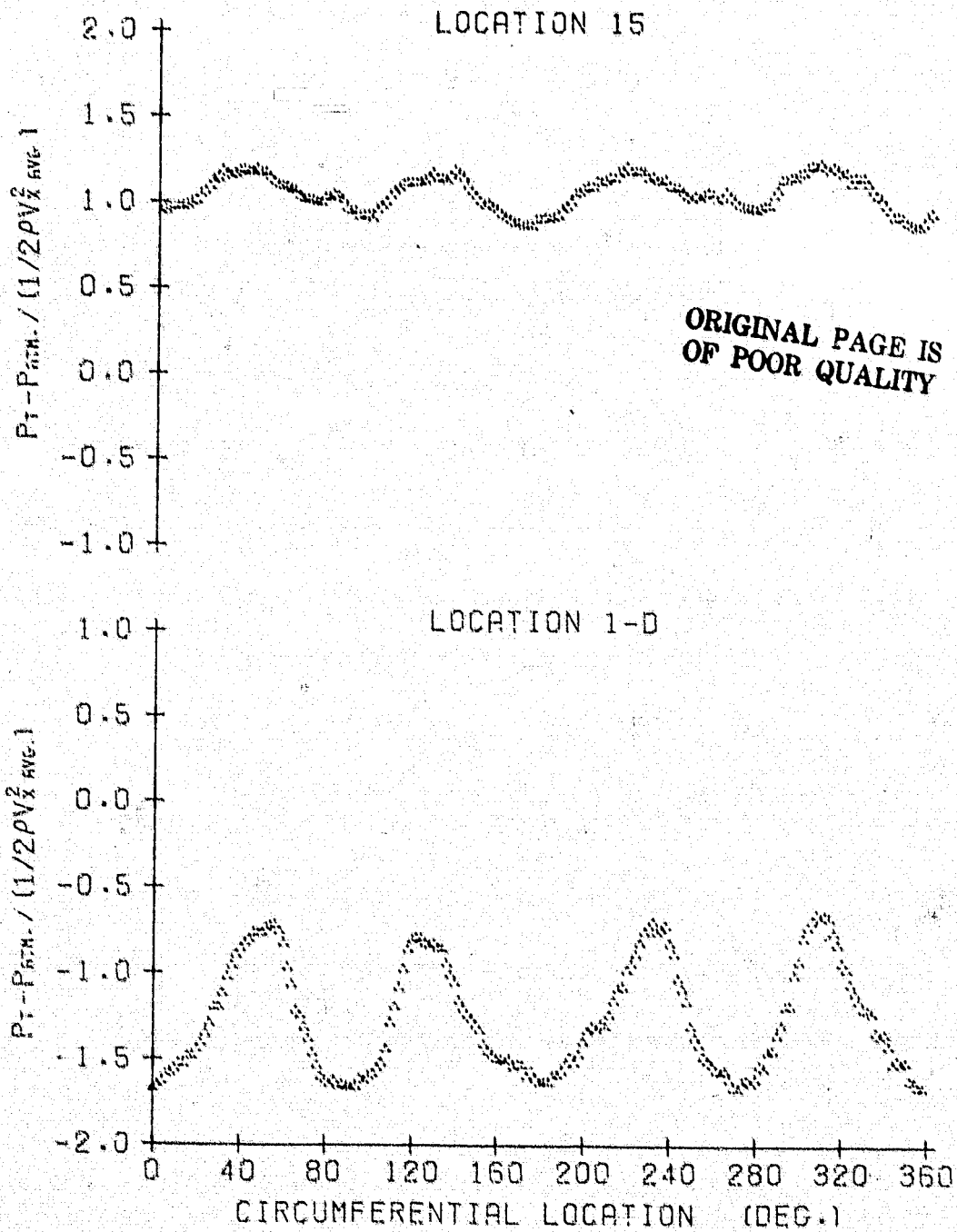


Figure D.88

10 October 1978

LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1663

AVG. FLOW COEF. = 0.534
AVG. P-RISE COEF. = 2.313
AVG. INCIDENCE = 5.77 DEG.

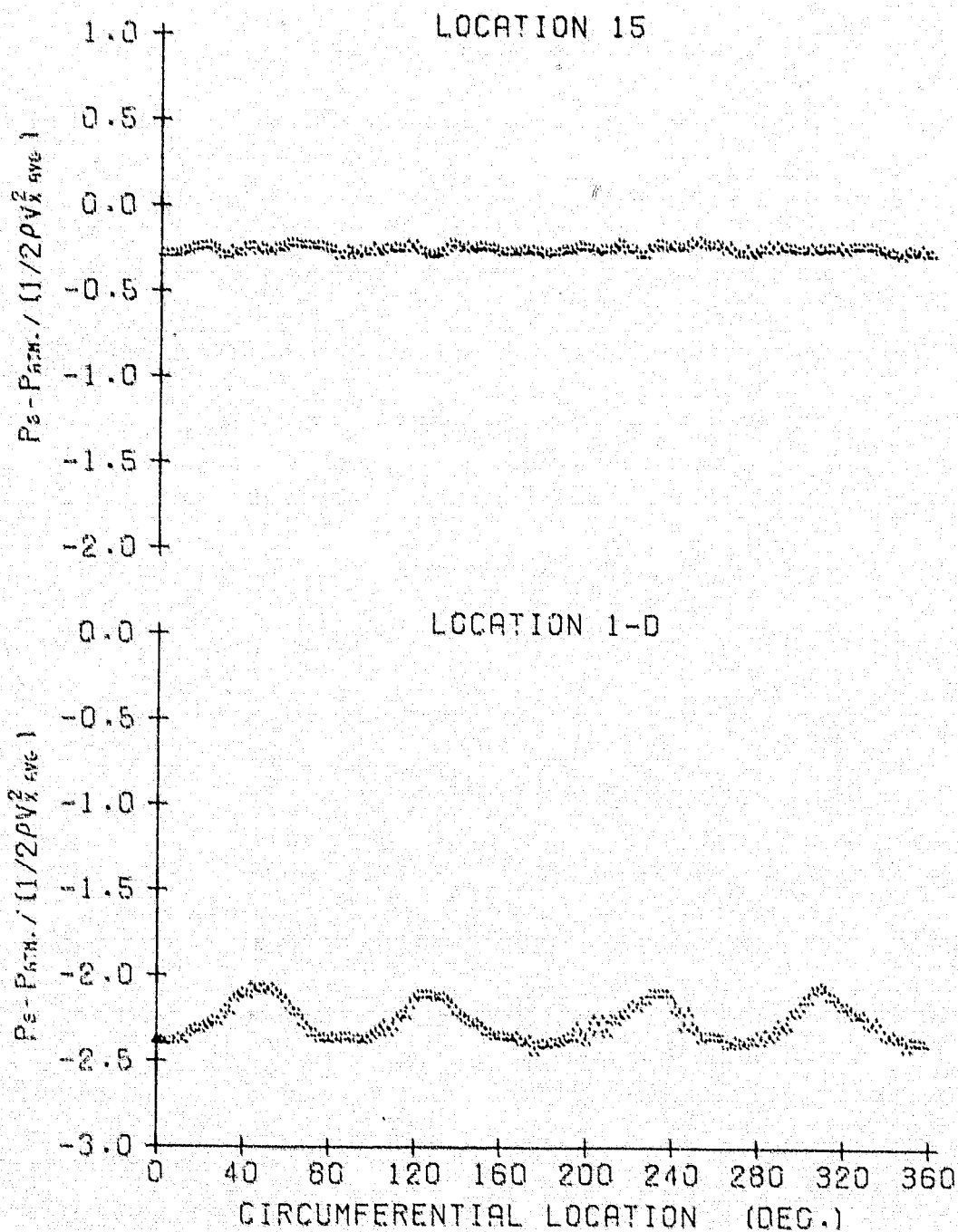


Figure D.89

10 October 1978
LCB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1663

AVG. FLOW COEF. = 0.534
AVG. P-RISE COEF. = 2.313
AVG. INCIDENCE = 5.77 DEG.

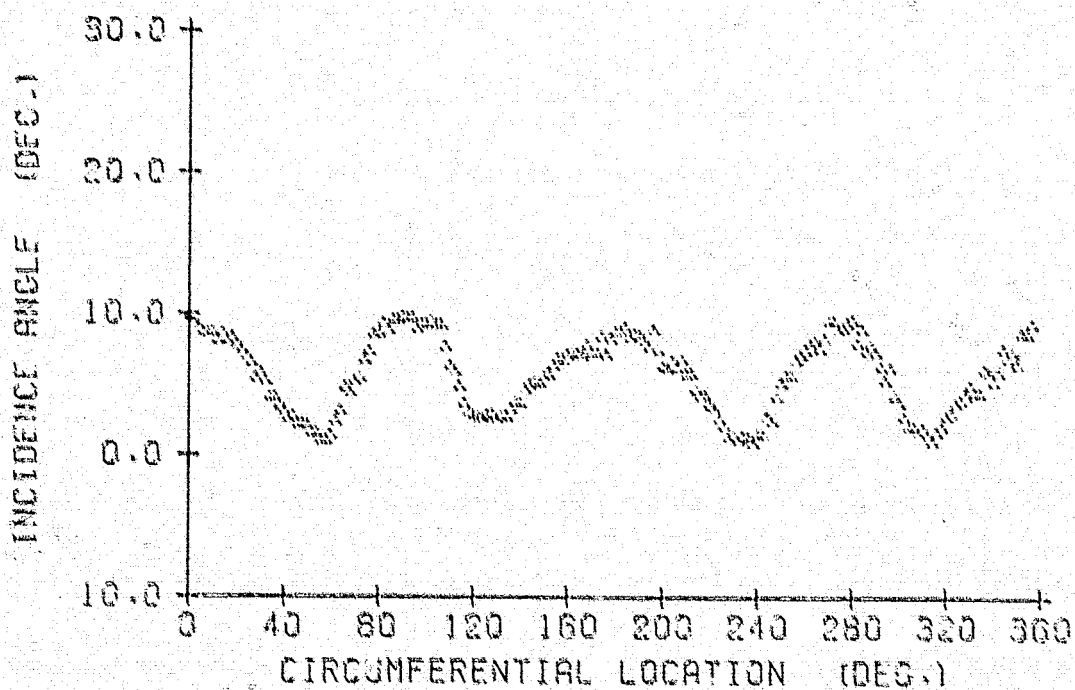


Figure D.90

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1663

AVG. FLOW COEF. = 0.529
AVG. P-RISE COEF. = 2.321
AVG. INCIDENCE = 5.97 DEG.

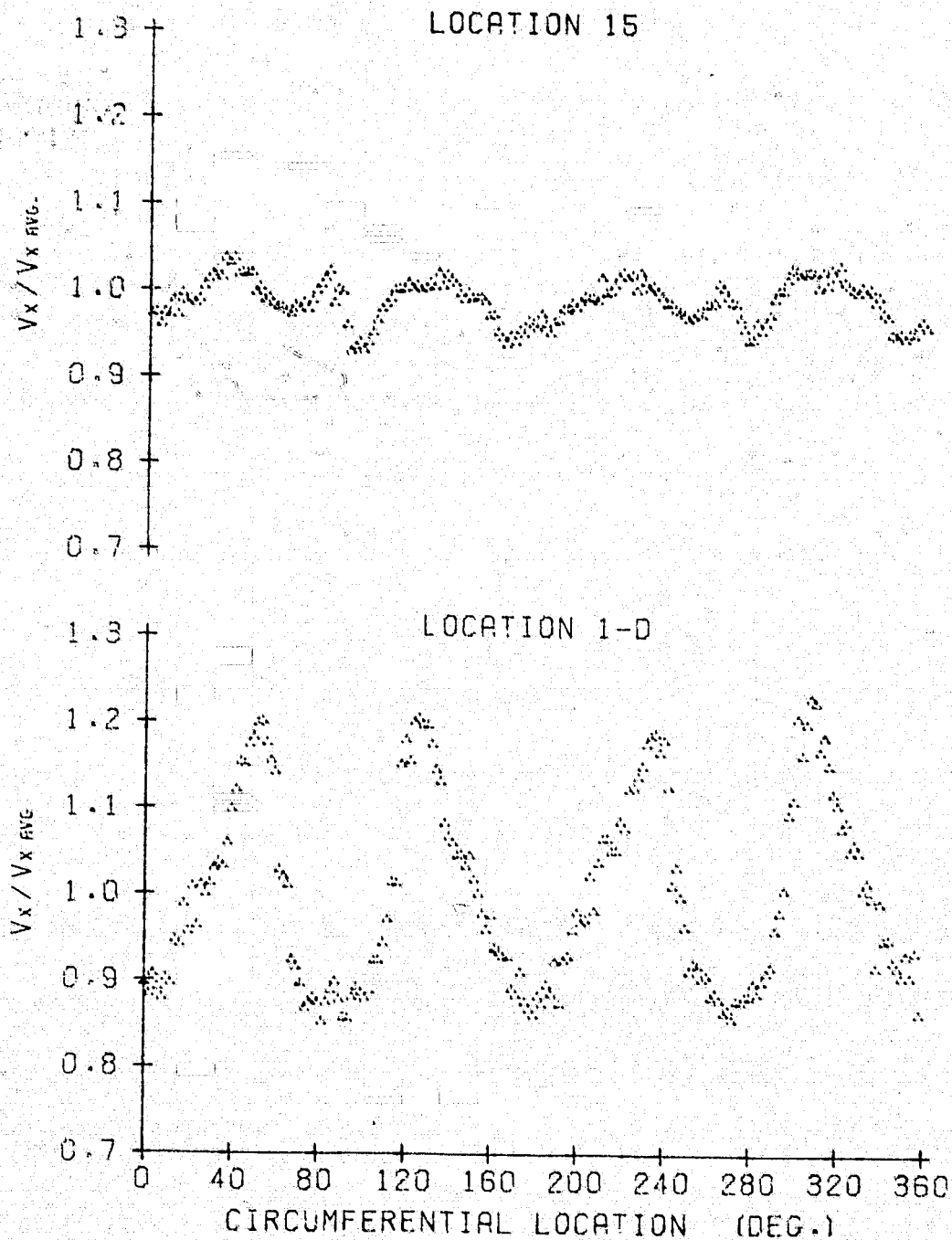


Figure D.91

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1663

AVG. FLOW COEF. = 0.529
AVG. P-RISE COEF. = 2.321
AVG. INCIDENCE = 5.97 DEG.

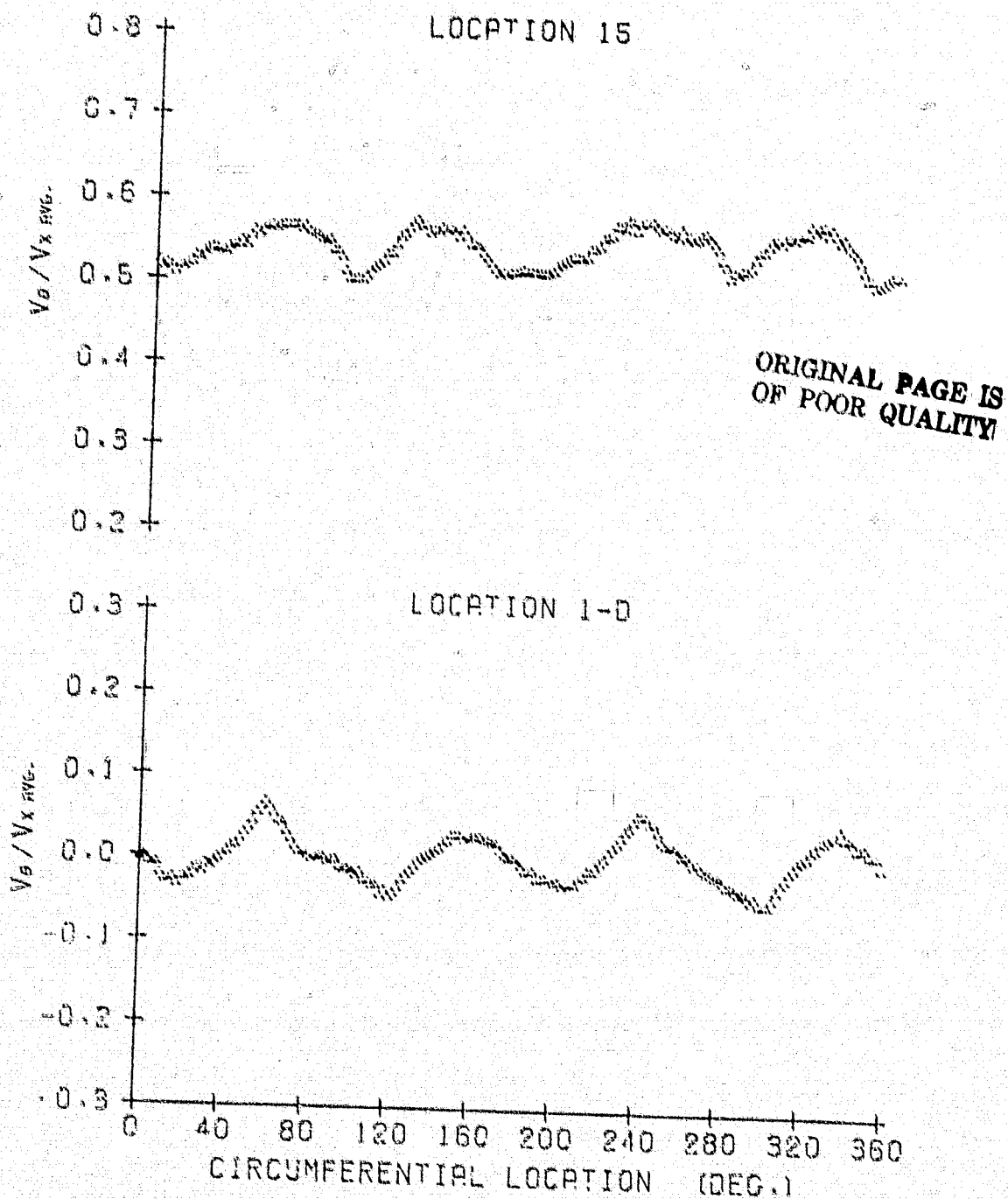


Figure D.92

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1663

AVG. FLOW COEF. = 0.529
AVG. P-RISE COEF. = 2.321
AVG. INCIDENCE = 5.97 DEG.

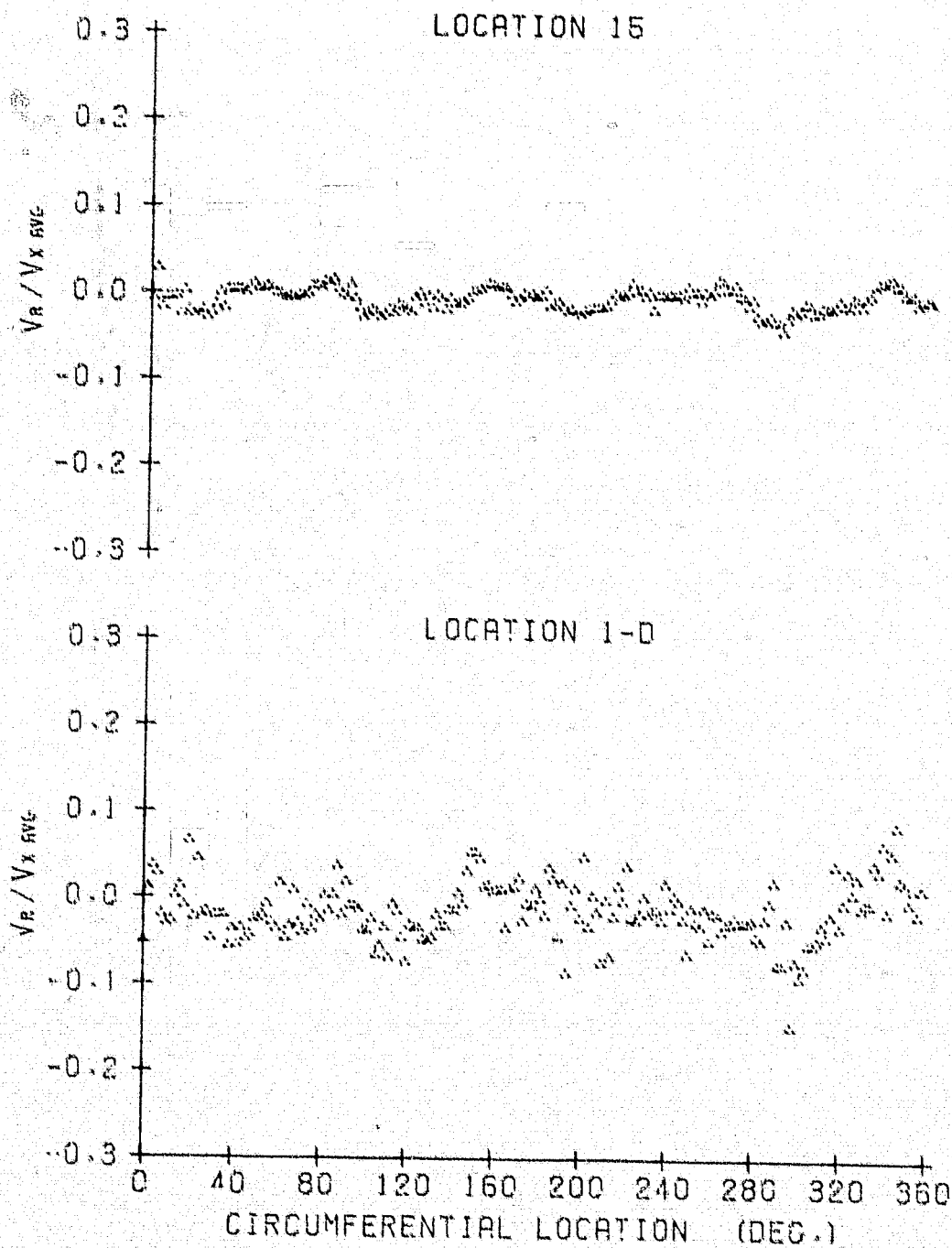


Figure D.93

10 October 1978

LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1663

AVG. FLOW COEF. = 0.529
AVG. P-RISE COEF. = 2.321
AVG. INCIDENCE = 5.97 DEG.

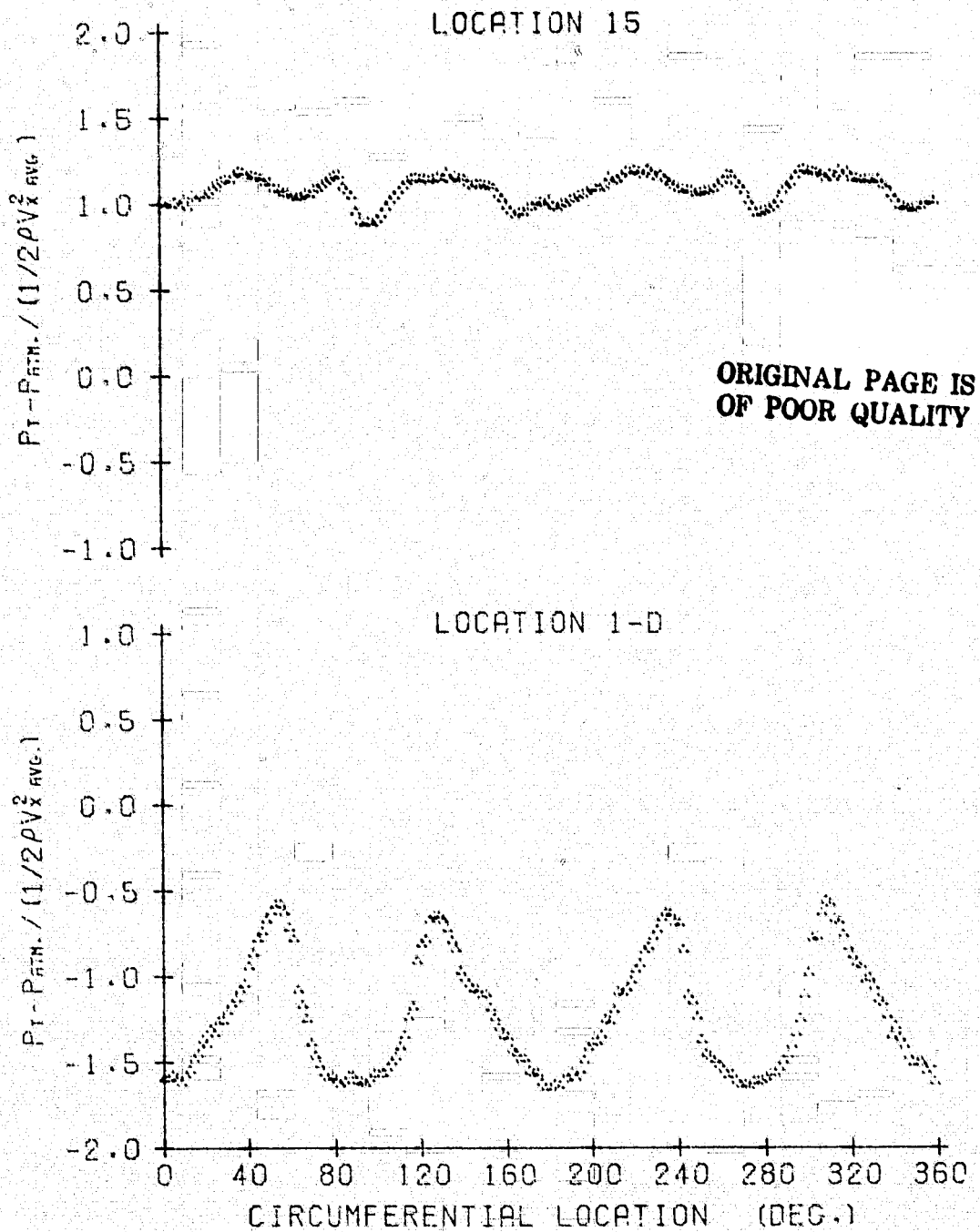


Figure D.94

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1663

AVG. FLOW COEF. = 0.529
AVG. P-RISE COEF. = 2.321
AVG. INCIDENCE = 5.97 DEG.

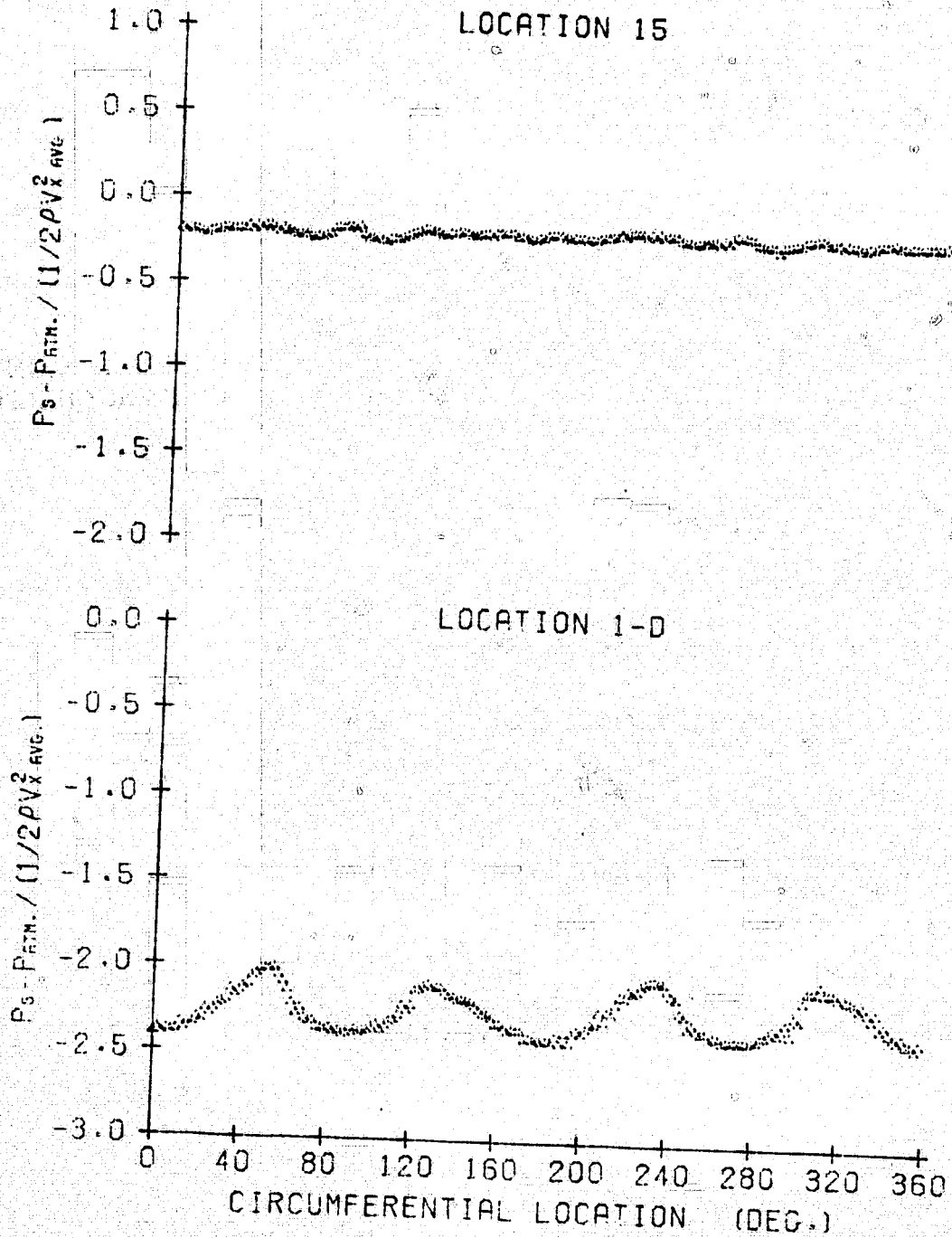


Figure D.95

10 October 1978
LCB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1663

AVG. FLOW COEF. = 0.529
AVG. P-RISE COEF. = 2.321
AVG. INCIDENCE = 5.97 DEG.

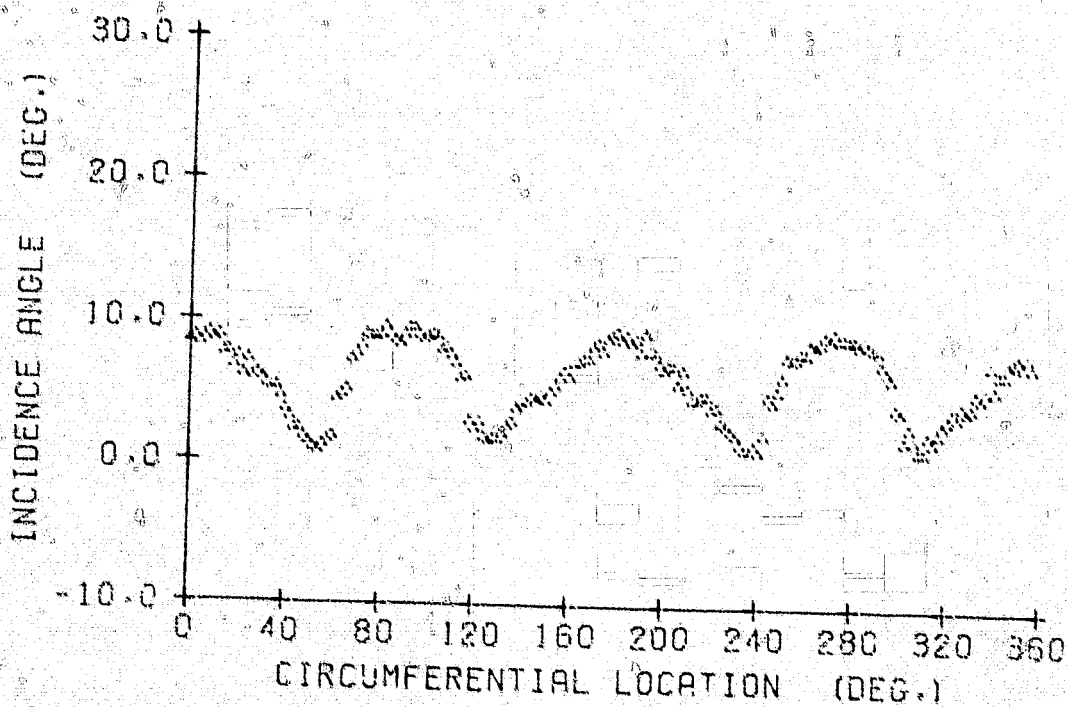


Figure D.96

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1663

AVG. FLOW COEF. = 0.552
AVG. P-RISE COEF. = 1.997
AVG. INCIDENCE = 4.87 DEG.

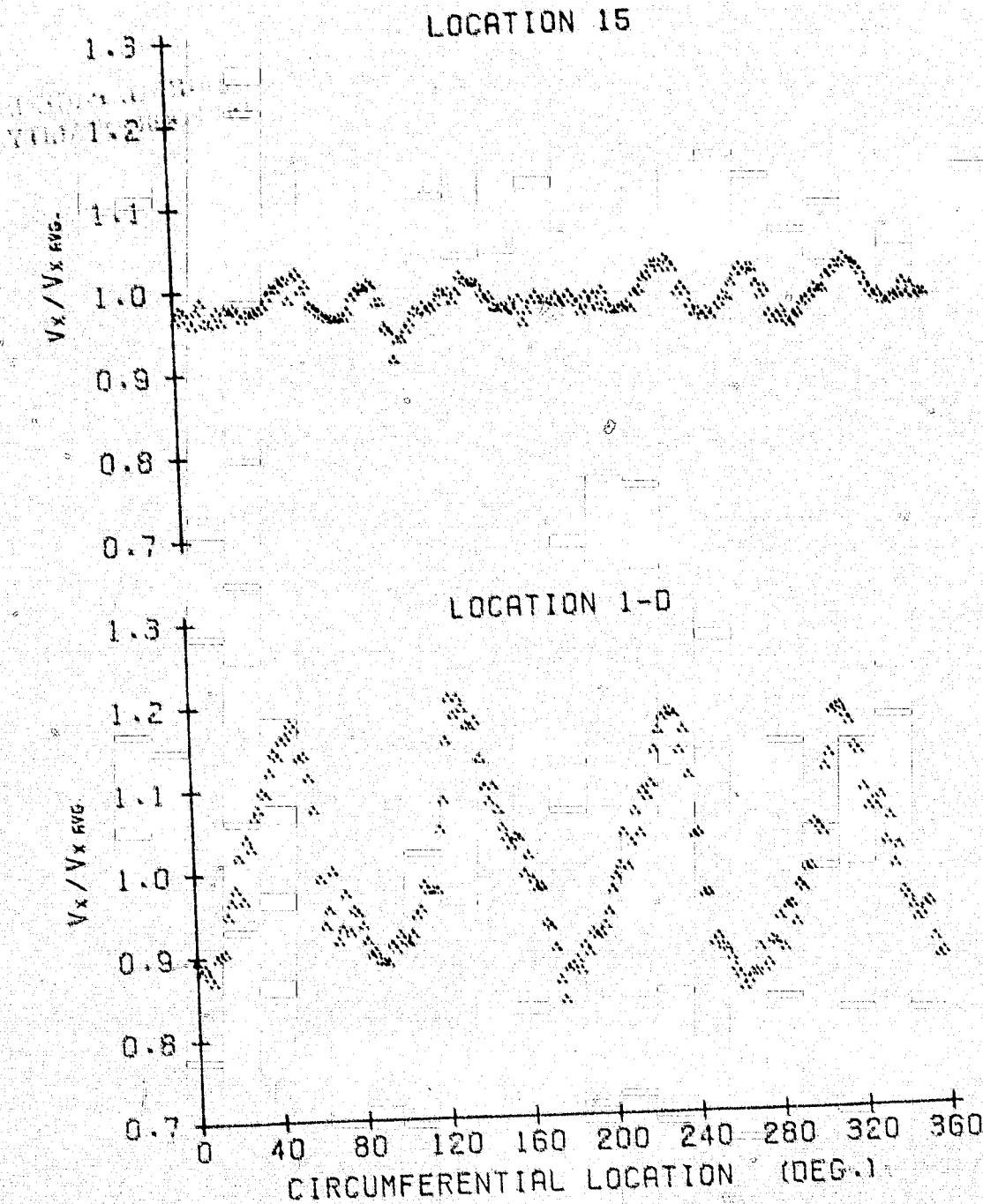


Figure D.97

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1663

AVG. FLOW COEF. = 0.552
AVG. P-RISE COEF. = 1.997
AVG. INCIDENCE = 4.87 DEG.

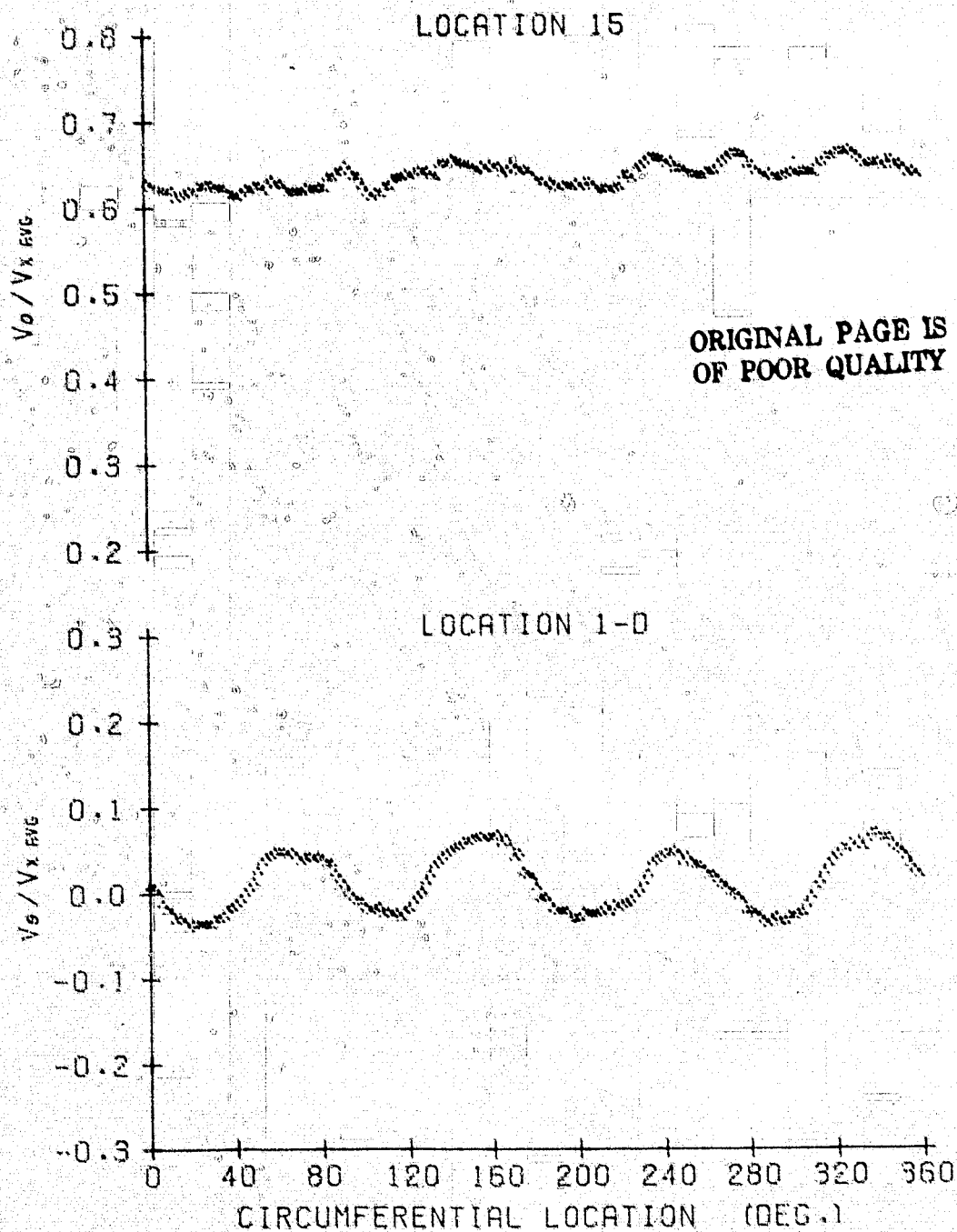


Figure D.98

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1663

AVG. FLOW COEF. = 0.552
AVG. P-RISE COEF. = 1.997
AVG. INCIDENCE = 4.87 DEG.

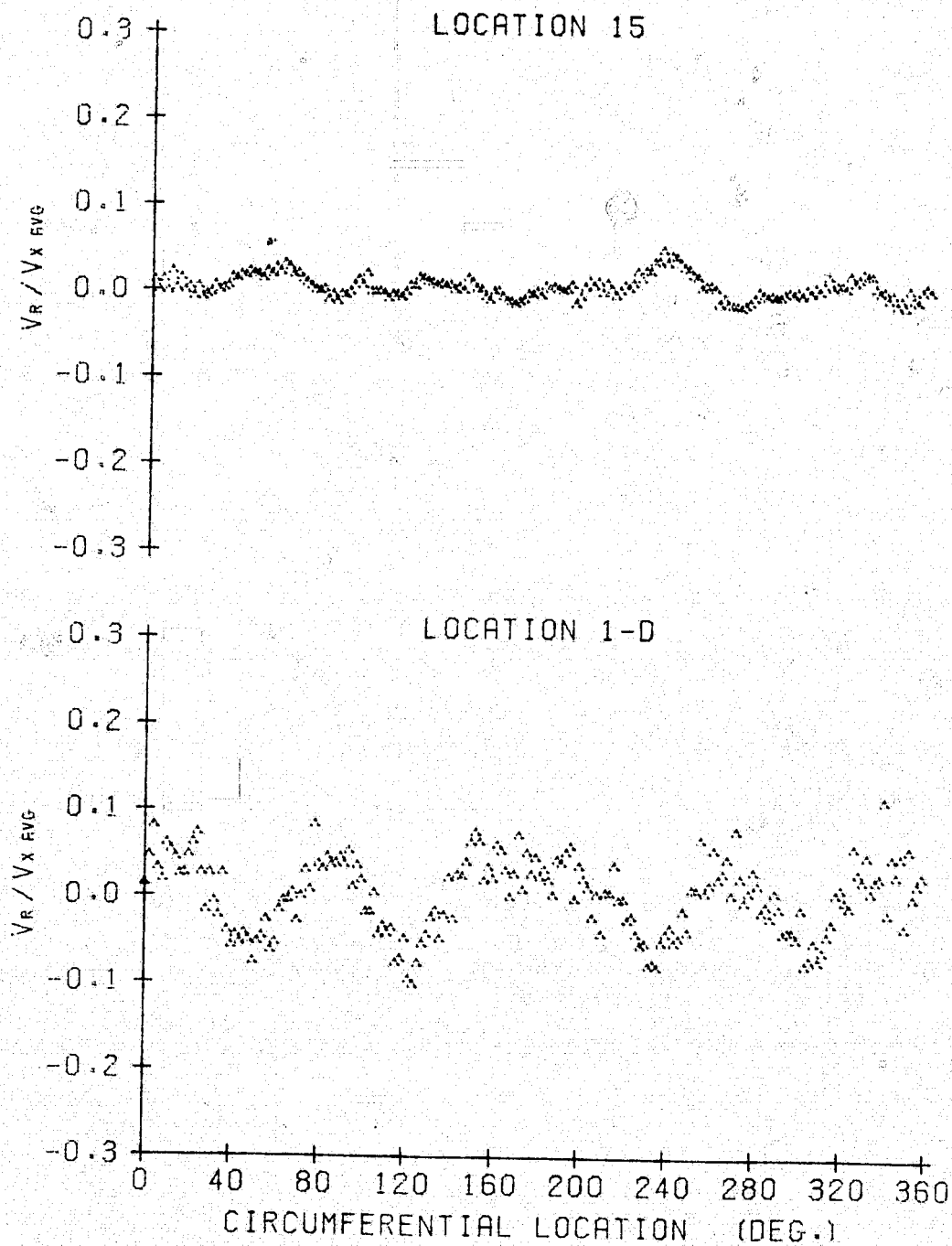


Figure D.99

10 October 1978
LGB:jep

4 BLADES
55 DEG. STAGGER ANGLE
1 CYCLE DISTORTION
RPM = 1663

AVG. FLOW COEF. = 0.352
AVG. P-RISE COEF. = 1.997
AVG. INCIDENCE = 4.87 DEG.

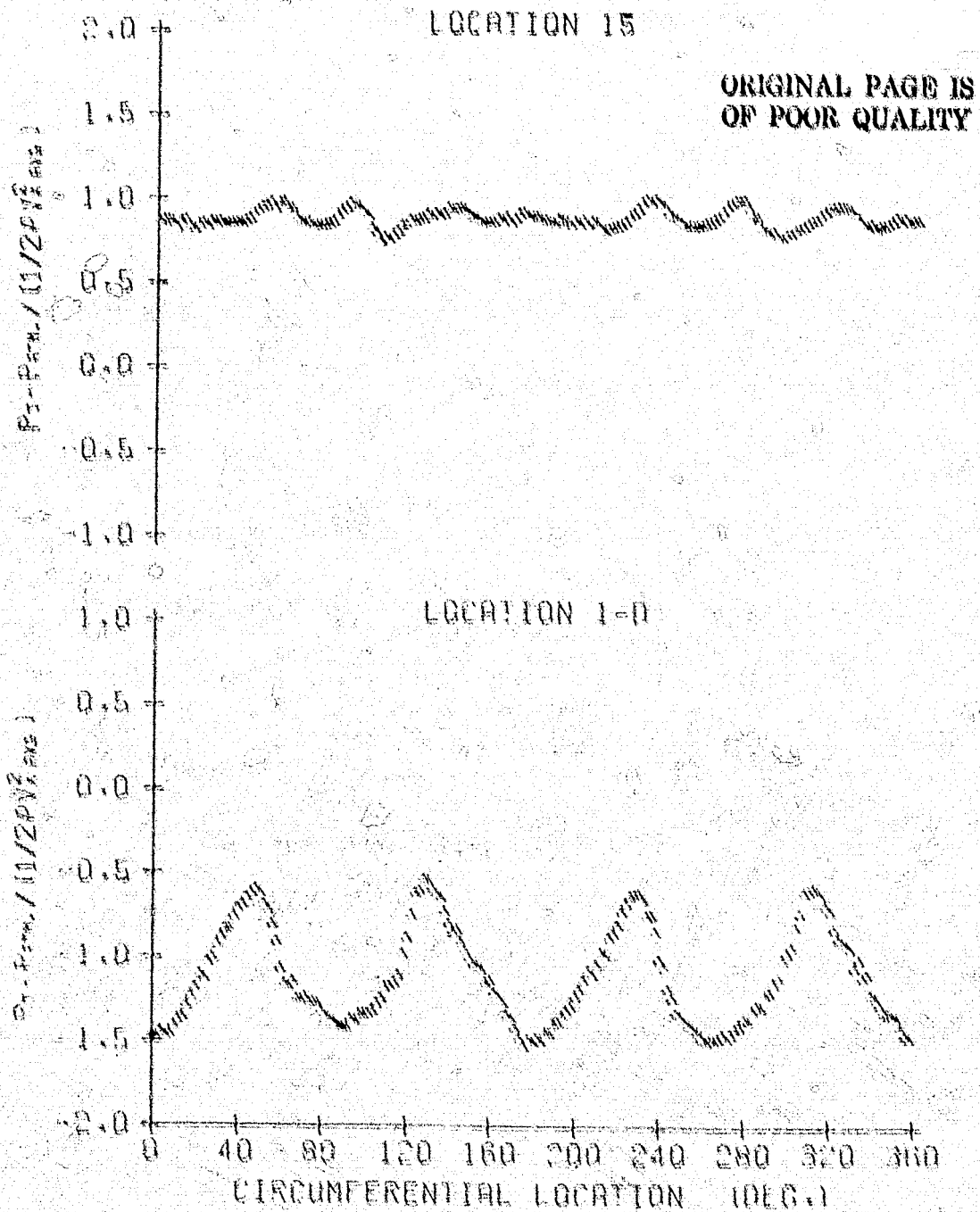


Figure D.100

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1663

AVG. FLOW COEF. = 0.552
AVG. P-RISE COEF. = 1.997
AVG. INCIDENCE = 4.87 DEG.

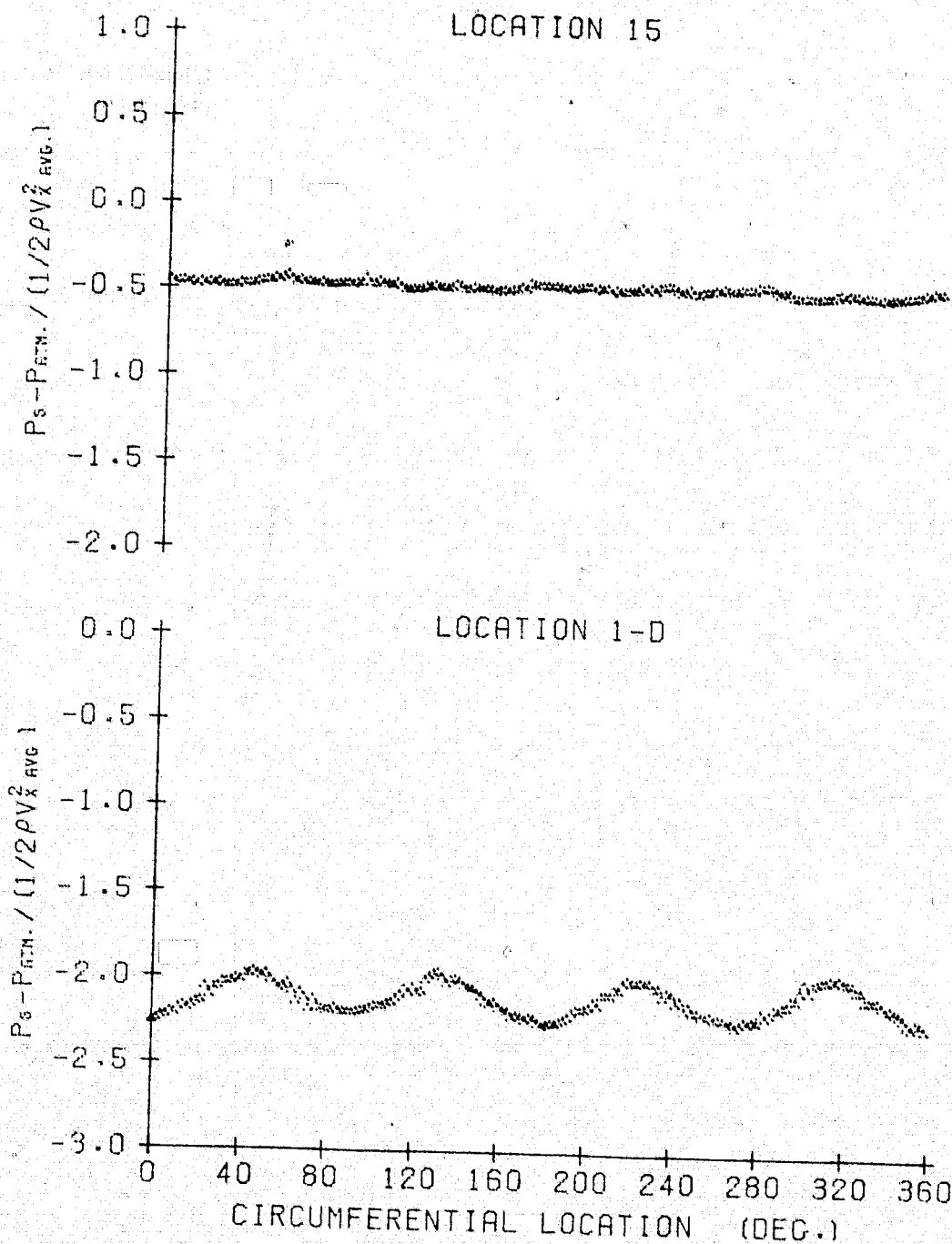


Figure D.101

10 October 1978
LCB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1663

AVG. FLOW COEF. = 0.552
AVG. P-RISE COEF. = 1.997
AVG. INCIDENCE = 4.87 DEG.

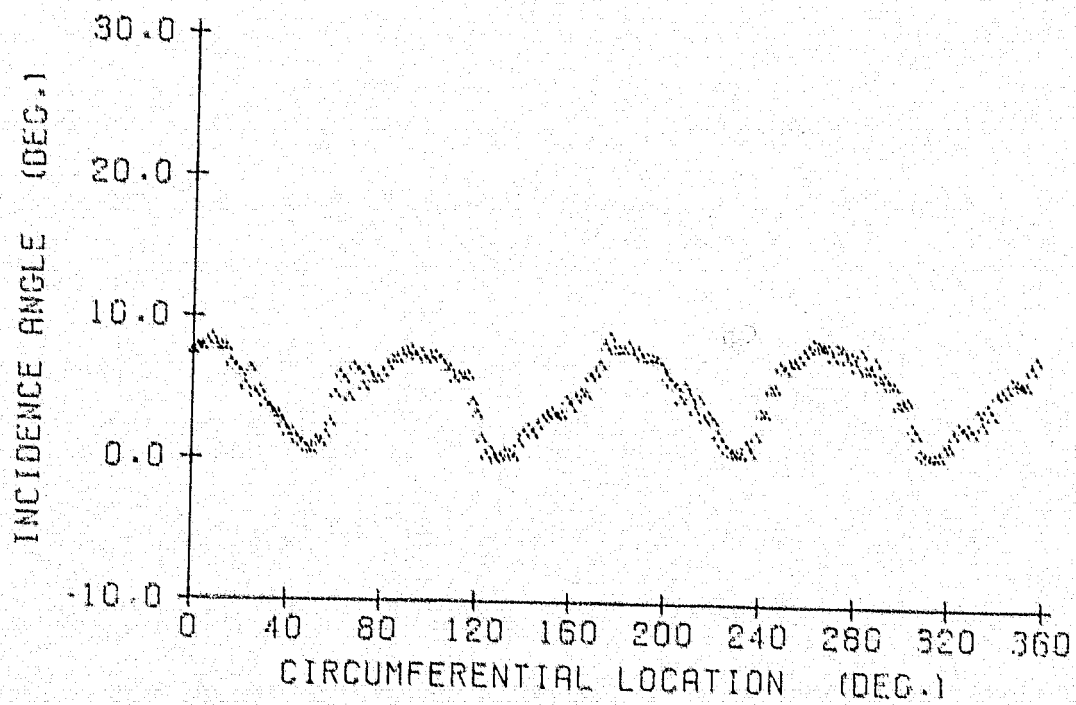


Figure D.102

10 October 1978

LCB:jep

3 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1663

AVG. FLOW COEF. = 0.519
AVG. P-RISE COEF. = 2.198
AVG. INCIDENCE = 6.46 DEG.

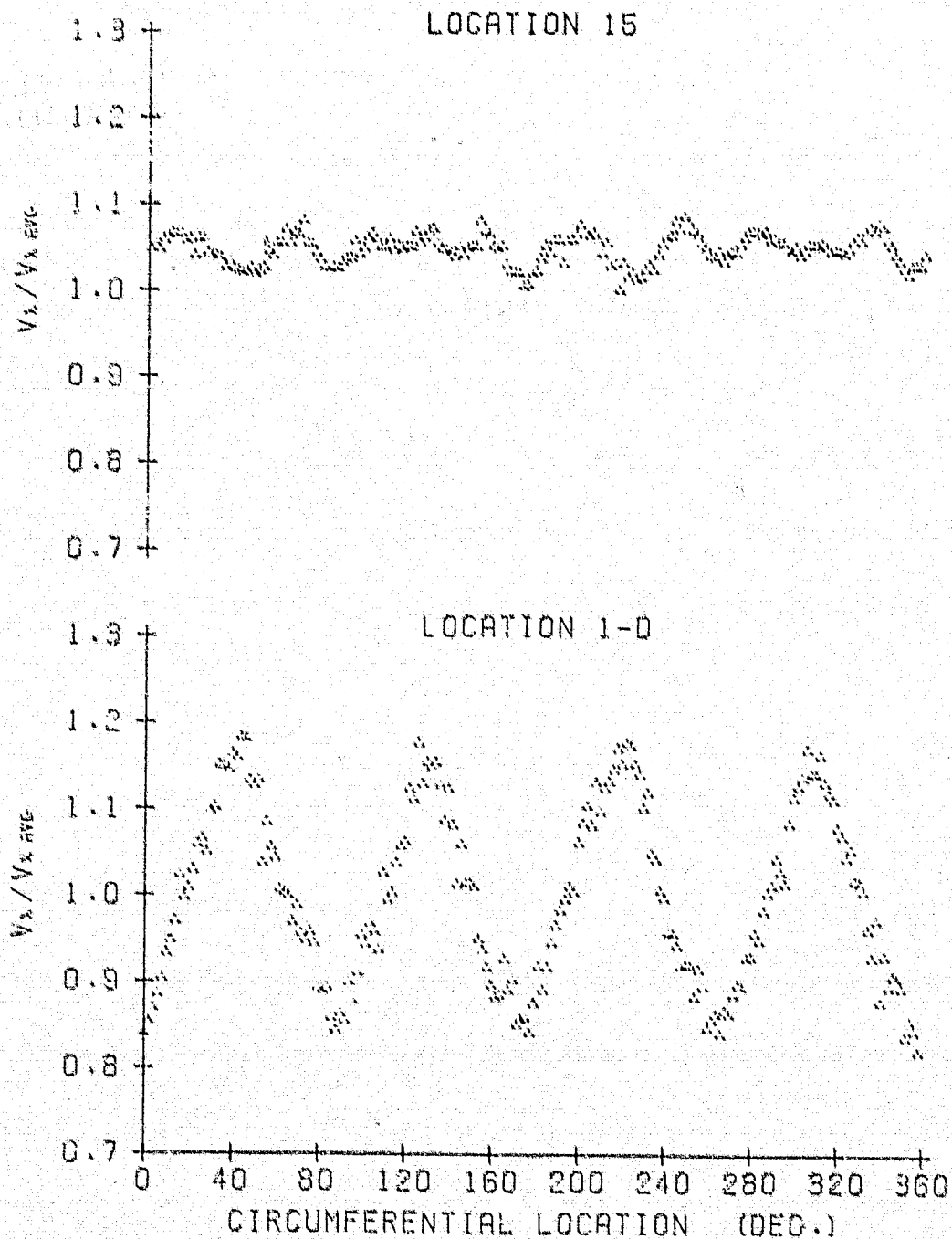


Figure D.103

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1663

AVG. FLOW COEFF. = 0.519
AVG. P-RISE COEFF. = 2.198
AVG. INCIDENCE = 6.46 DEG.

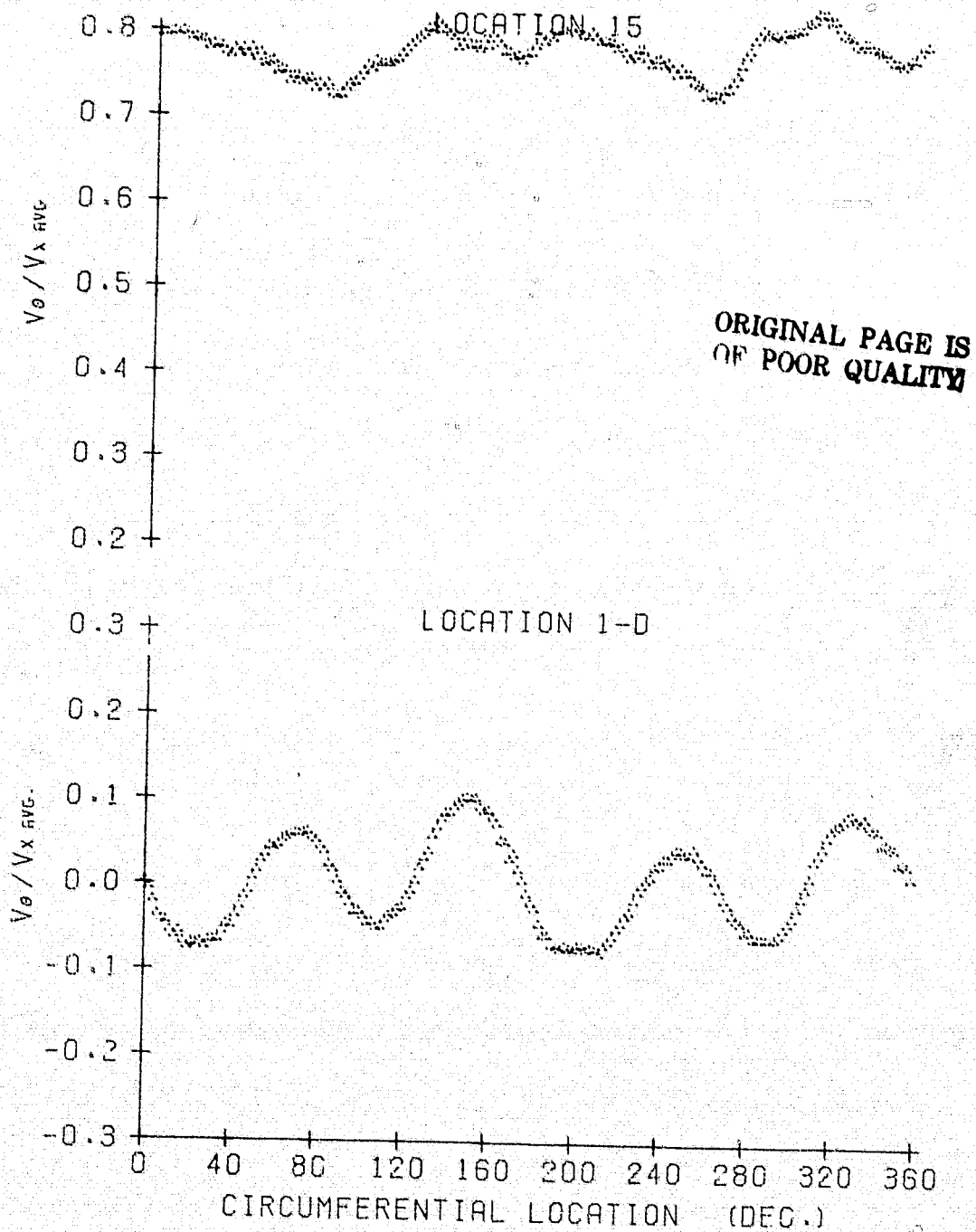


Figure D.104

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1663

AVG. FLOW COEF. = 0.519
AVG. P-RISE COEF. = 2.198
AVG. INCIDENCE = 6.46 DEG.

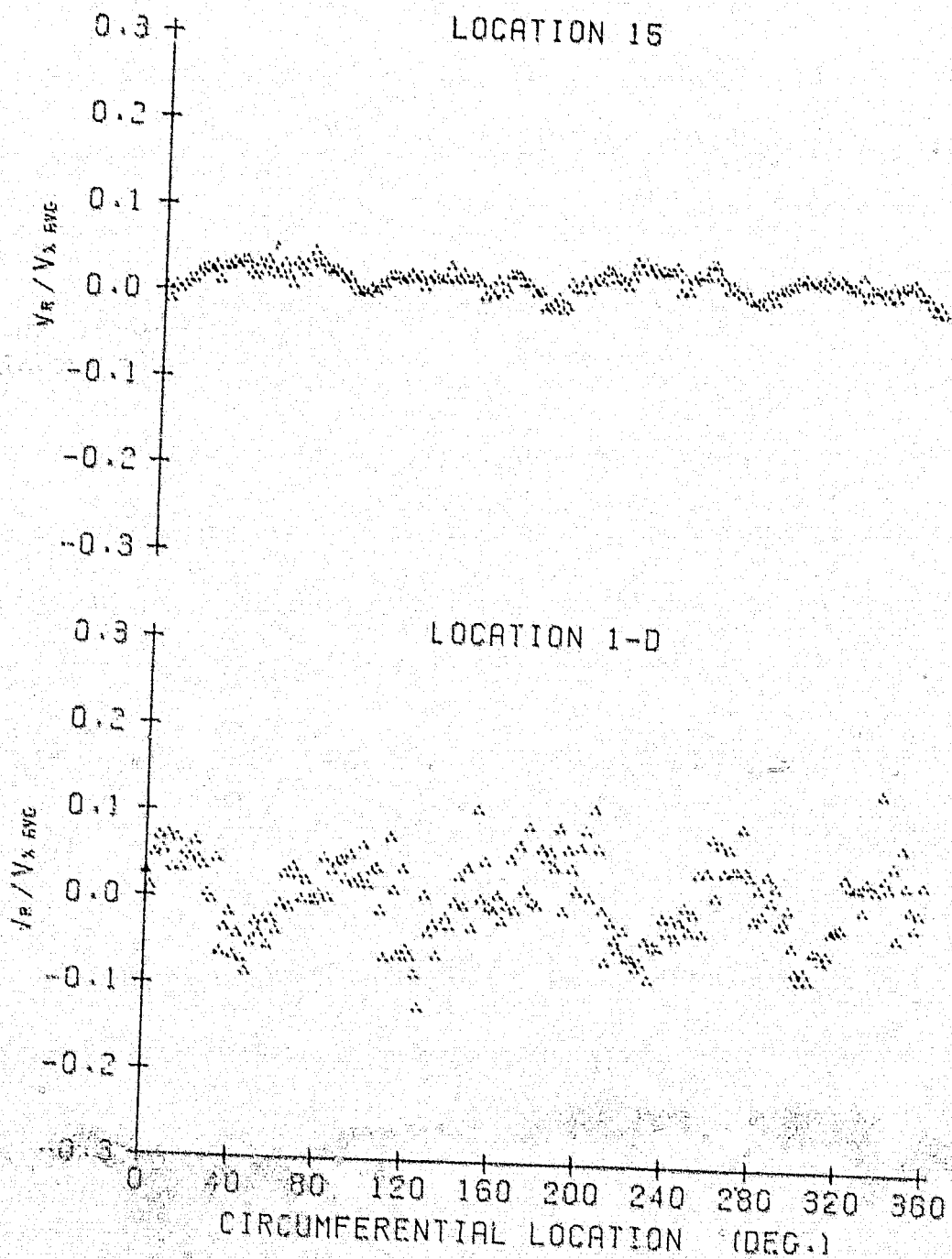


Figure D.105

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1663

AVG. FLOW COEFF. = 0.519
AVG. P-RISE COEFF. = 2.198
AVG. INCIDENCE = 6.46 DEG.

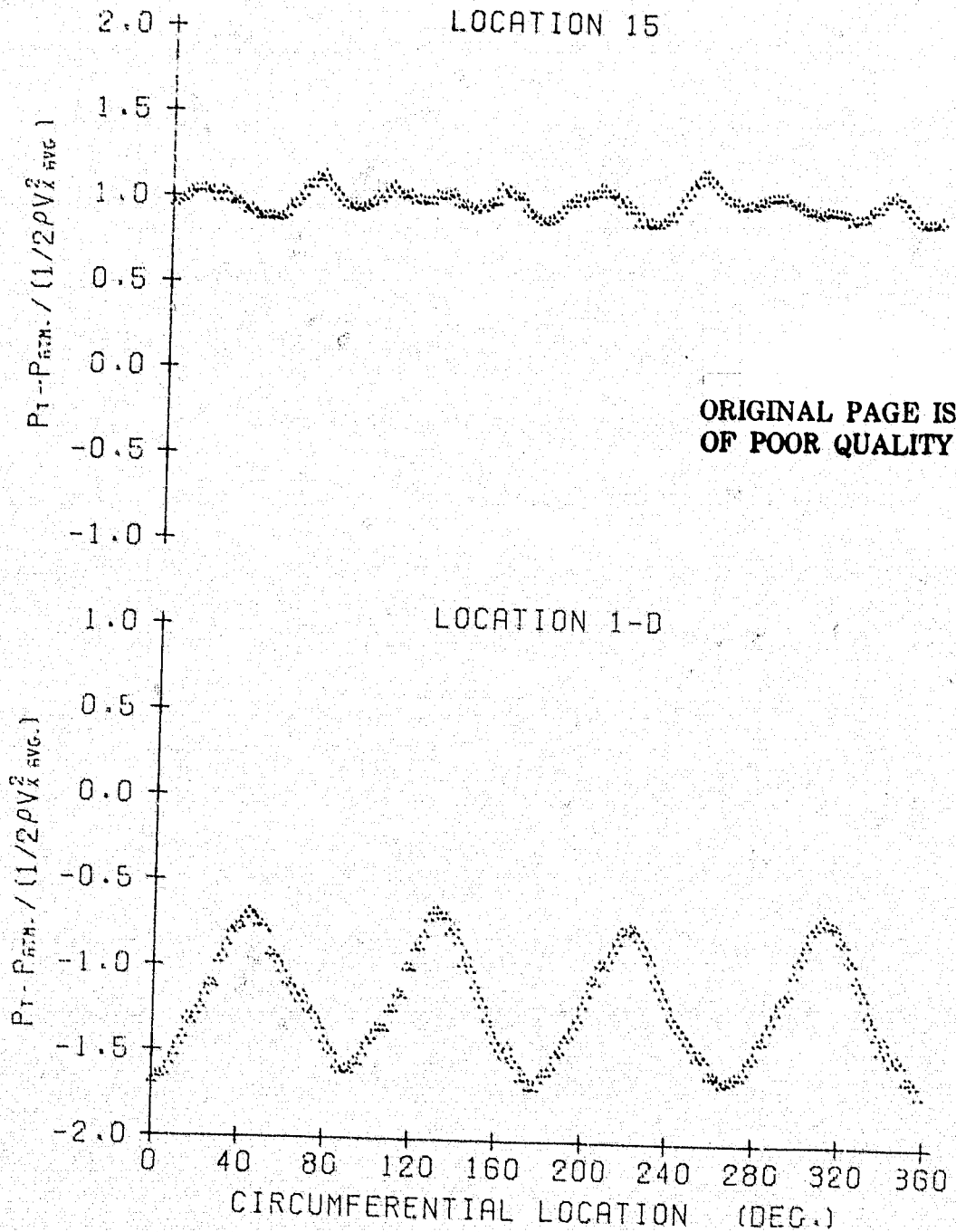


Figure D.106

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1663

AVG. FLOW COEF. = 0.519
AVG. P-RISE COEF. = 2.198
AVG. INCIDENCE = 6.46 DEG.

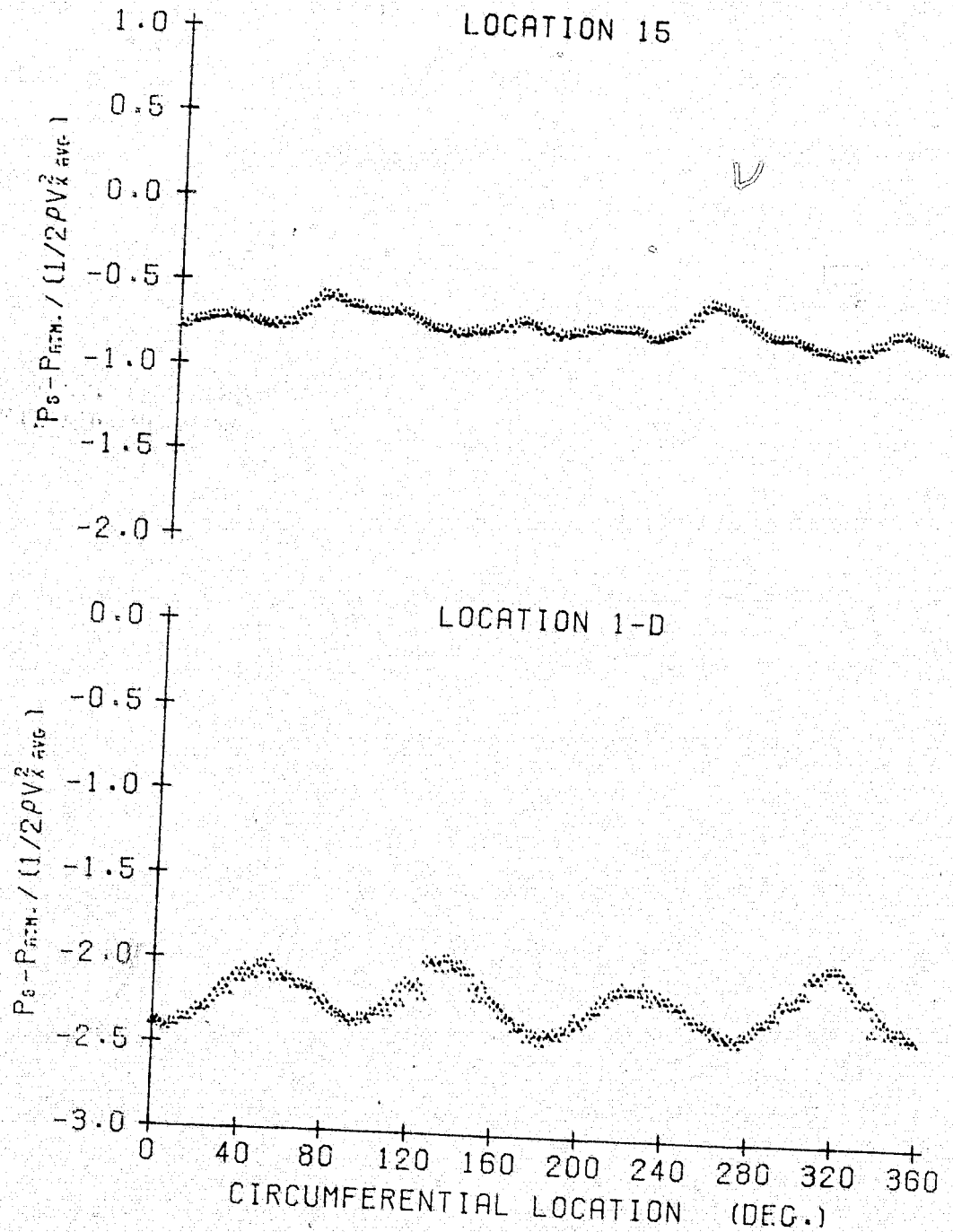


Figure D.107

10 October 1978
LCB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
4 CYCLE DISTORTION
RPM = 1663

AVG. FLOW COEF. = 0.519
AVG. P-RISE COEF. = 2.198
AVG. INCIDENCE = 6.46 DEG.

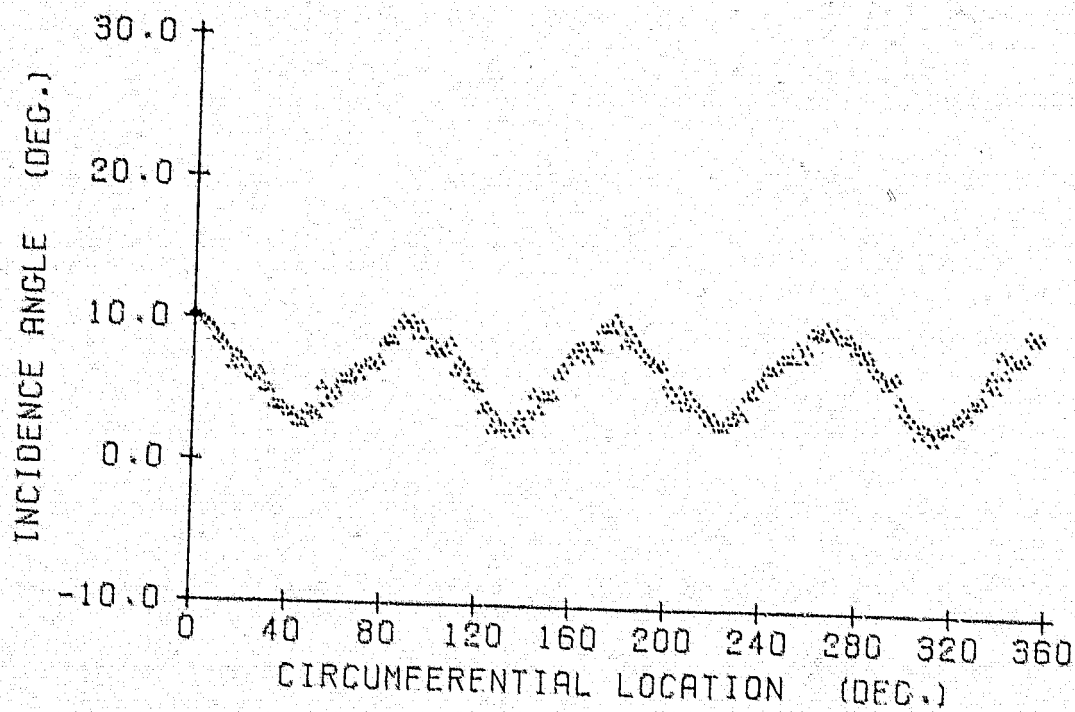


Figure D.108

Appendix E

Data for the Six-Cycle Sinusoidal Distortion

Table E.1

Test Conditions for the Six-Cycle Sinusoidal Distortion

Figure Numbers	Solidity	Rotor/Stator Spacing	Distance from Hub Surface
E.1-E.6	0.74	—	2.75 in. (6.985cm)
E.7-E.12	0.74	—	2.75 in.
E.13-E.18	0.74	—	2.75 in.
E.19-E.24	0.74	—	2.75 in.
E.25-E.30	0.74	—	2.75 in.
E.31-E.36	0.74	—	2.75 in.
E.37-E.42	0.74	—	2.75 in.
E.43-E.48	0.74	—	2.75 in.
E.49-E.54	1.11	12 in. (30.48cm)	2.75 in.
E.55-E.60	1.11	12 in.	2.75 in.
E.61-E.66	1.11	12 in.	2.75 in.
E.67-E.72	1.11	3 in. (7.62cm)	2.75 in.
E.73-E.78	1.11	3 in.	2.75 in.
E.79-E.84	1.11	3 in.	2.75 in.

Table E.1 (con't)

Test Conditions for the Six-Cycle Sinusoidal Distortion

Figure Numbers	No. of Blades	Stagger Angle (degrees)	$V_{xavginlet}$ (ft/sec)	$V_{xavgexit}$ (ft/sec)	RPM	Average ϕ	Average $\Delta P_T / \frac{1}{2} \rho V_{xavg}^2$	Average Incidence (degrees)
E.1-E.6	6	35	65.38	65.00	714	1.354	0.001	1.20
E.7-E.12	6	35	69.66	67.57	1020	1.010	0.424	9.58
E.13-E.18	6	35	69.40	69.44	1260	0.814	0.911	15.79
E.19-E.24	6	45	67.00	66.12	1020	0.971	0.029	0.76
E.25-E.30	6	45	66.54	68.73	1413	0.696	0.851	10.13
E.31-E.36	6	55	66.93	67.30	1457	0.679	0.131	0.19
E.37-E.42	6	55	67.27	66.79	1698	0.586	0.708	4.25
E.43-E.48	6	55	65.98	66.86	2002	0.487	1.767	8.52
E.49-E.54	9	50	66.08	66.56	1562	0.626	1.244	1.65
E.55-E.60	9	50	62.00	58.04	1741	0.527	2.316	5.97
E.61-E.66	9	50	67.45	65.01	1882	0.530	2.515	5.81
E.67-E.72	9	50	65.31	68.44	1562	0.618	1.301	2.09
E.73-E.78	9	50	63.16	58.70	1741	0.536	2.133	5.61
E.79-E.84	9	50	68.87	66.08	1882	0.541	2.305	5.40

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6 BLADES
35 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 714

AVG. FLOW COEF. = 1.354
AVG. P-RISE COEF. = 0.001
AVG. INCIDENCE = 1.20 DEG.

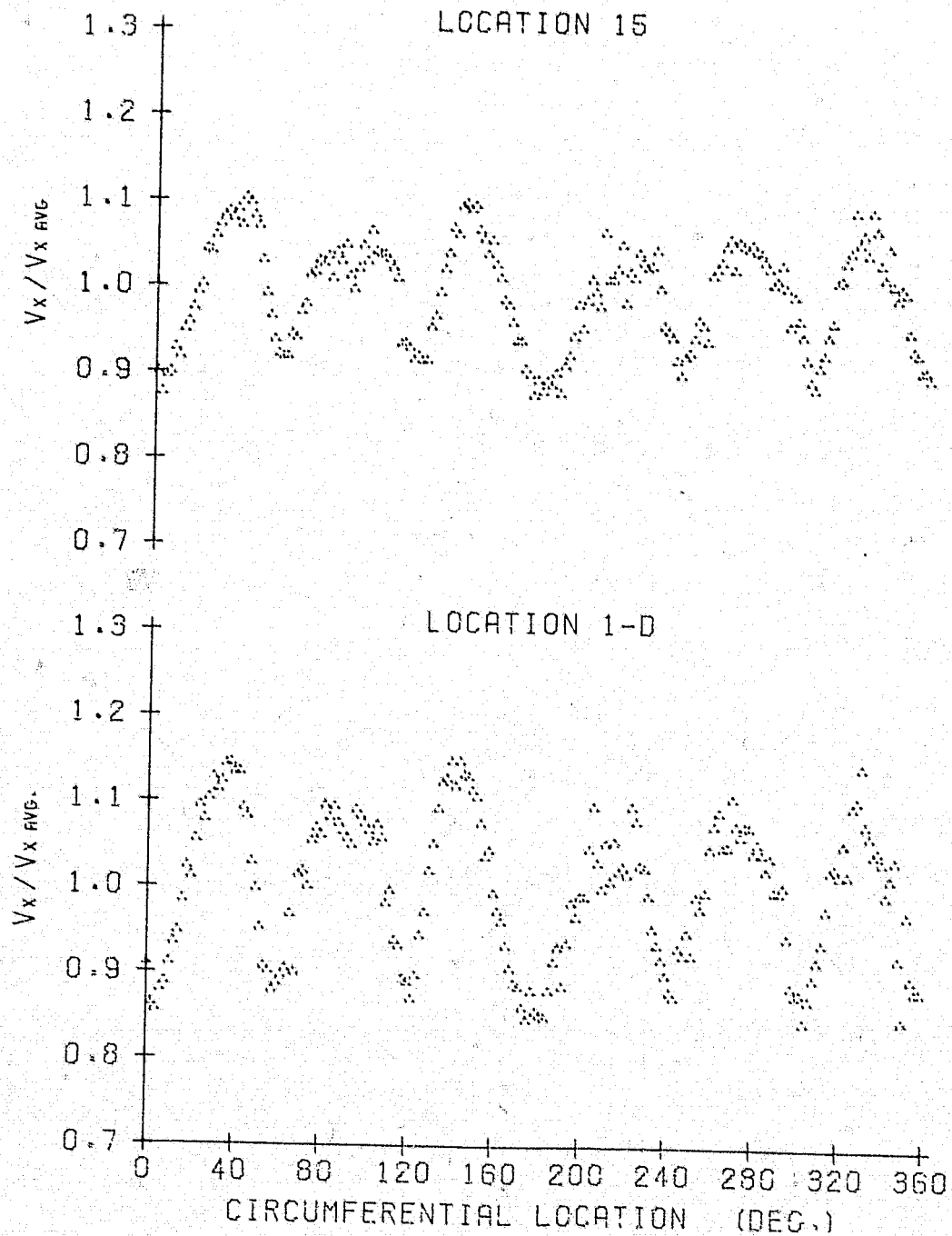


Figure E.1

10 October 1978
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6 BLADES
35 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 714

AVG. FLOW COEF. = 1.354
AVG. P-RISE COEF. = 0.001
AVG. INCIDENCE = 1.20 DEG.

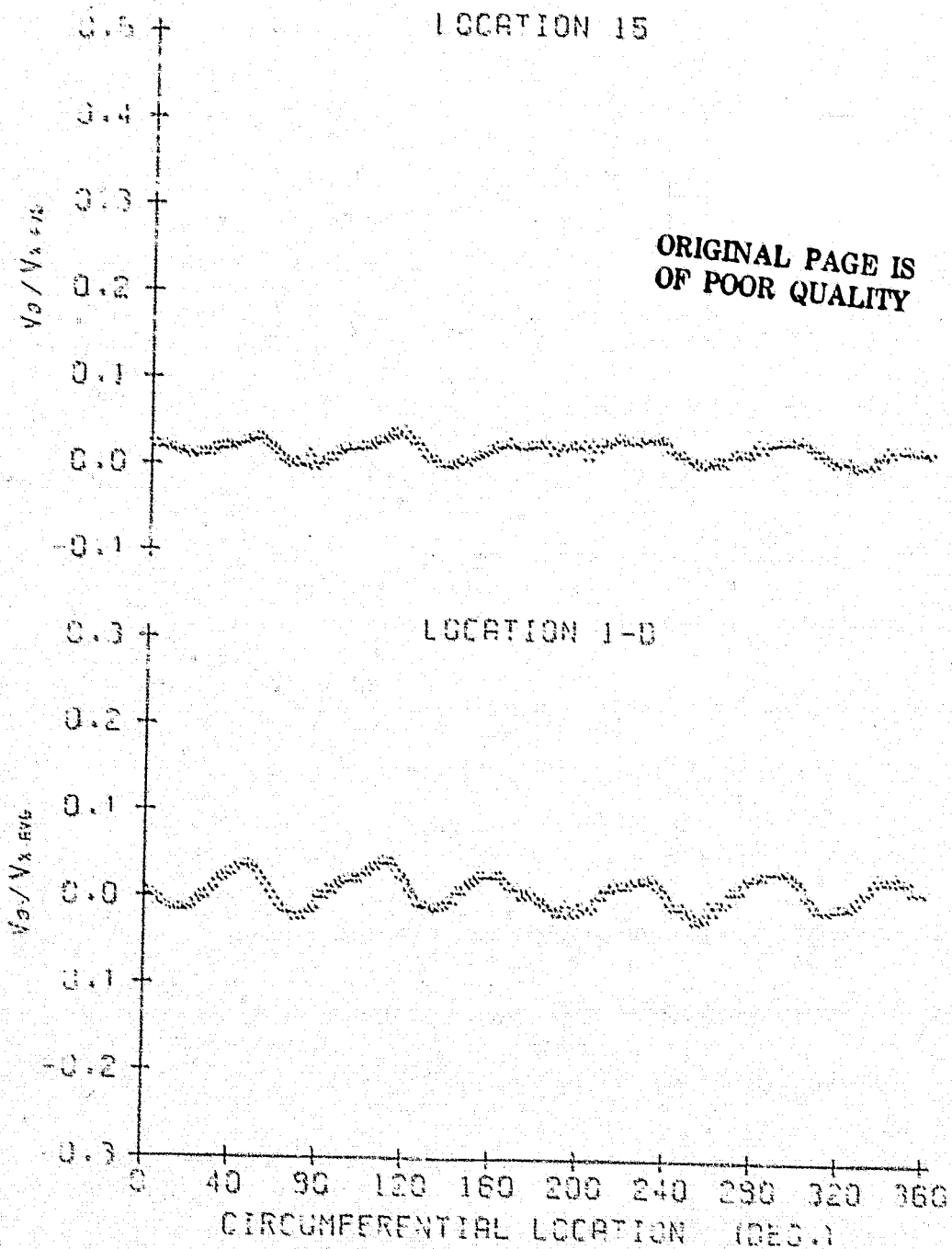


Figure E.2

10 October 1978
LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 714

AVG. FLOW COEF. = 1.354
AVG. P-RISE COEF. = 0.001
AVG. INCIDENCE = 1.20 DEG.

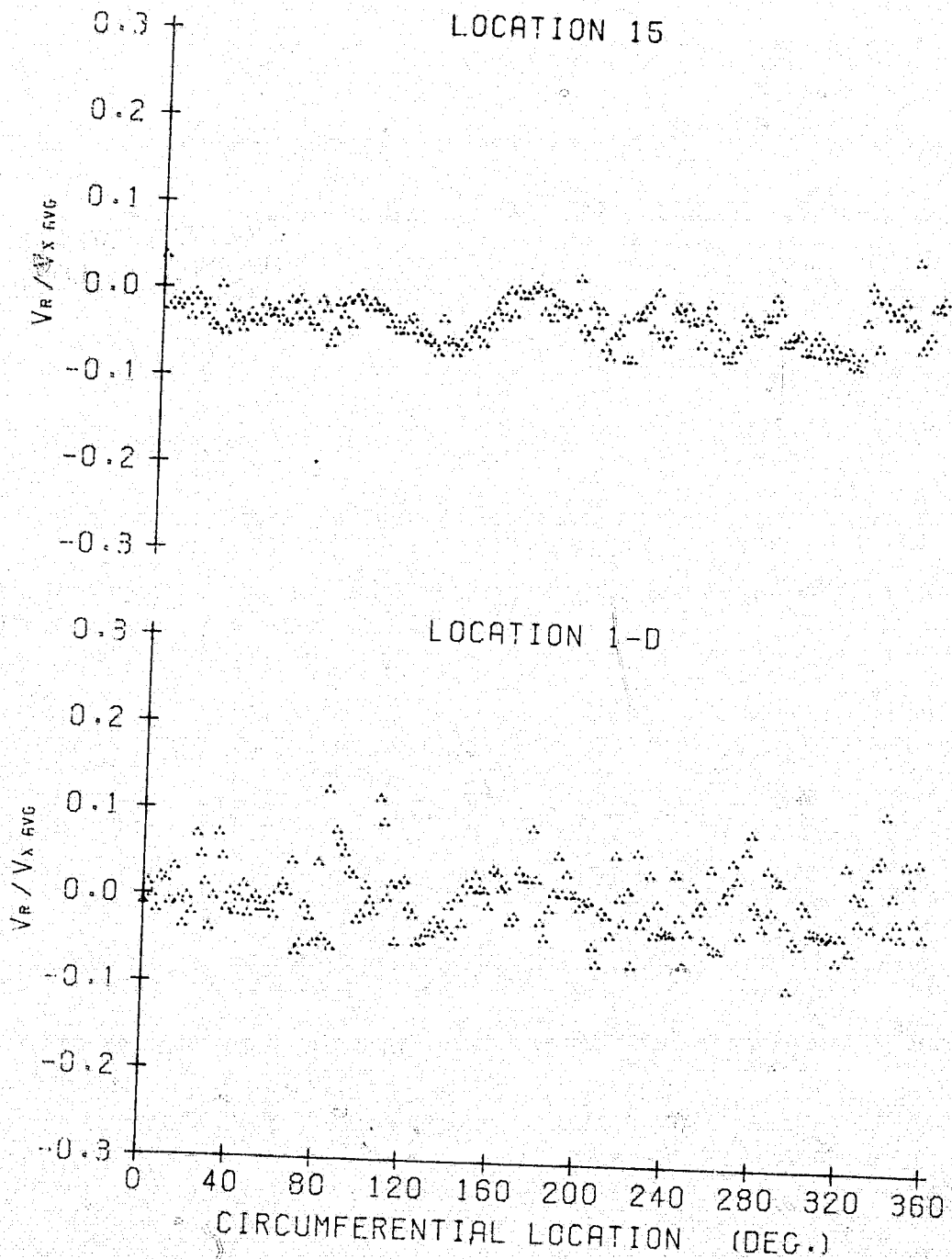


Figure E.3

10 October 1978

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6 BLADES
35 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 714

AVG. FLOW COEF. = 1.354
AVG. P-RISE COEF. = 0.001
AVG. INCIDENCE = 1.20 DEG.

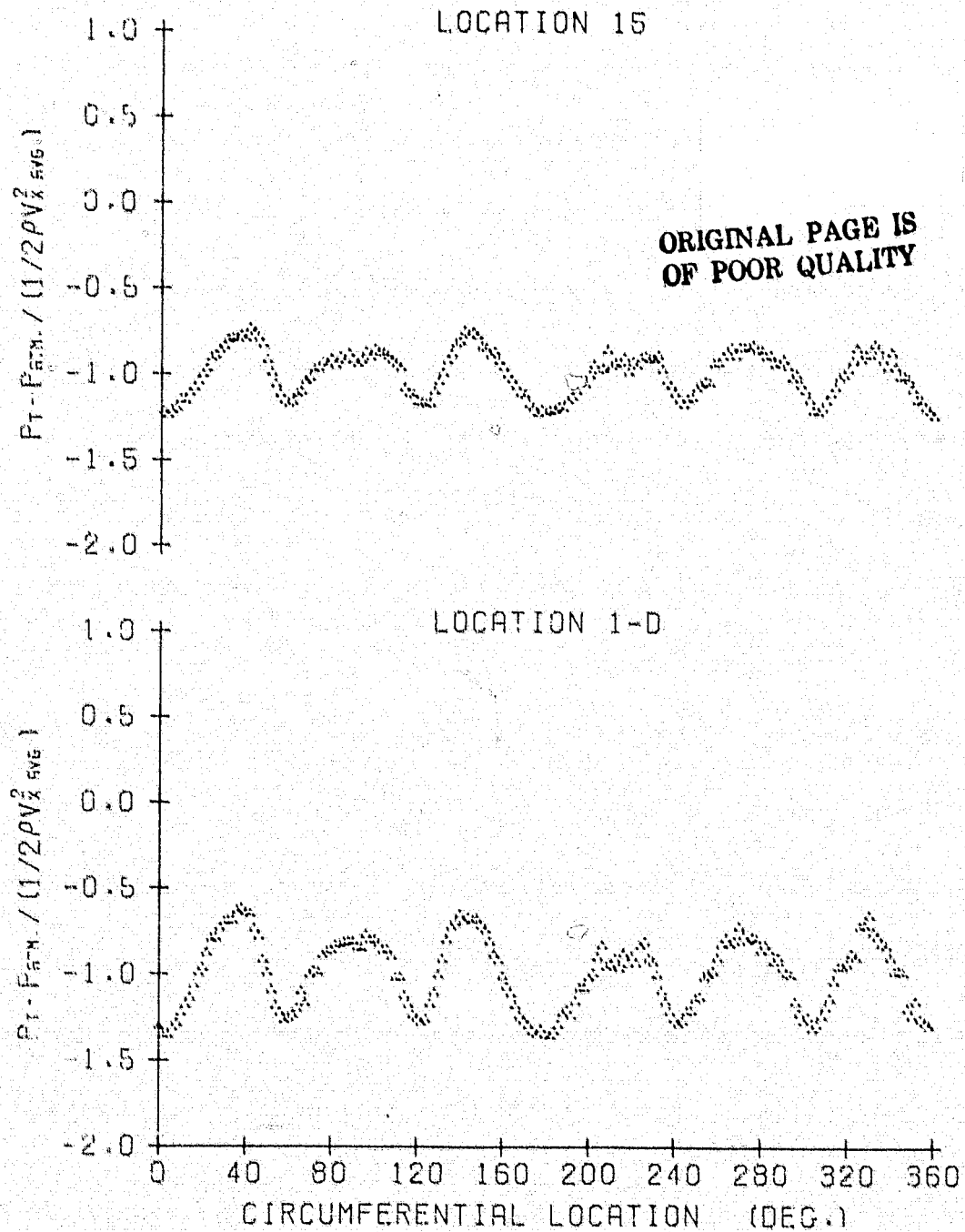


Figure E.4

10 October 1978
LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 714

AVG. FLOW COEF. = 1.354
AVG. P-RISE COEF. = 0.001
AVG. INCIDENCE = 1.20 DEG.

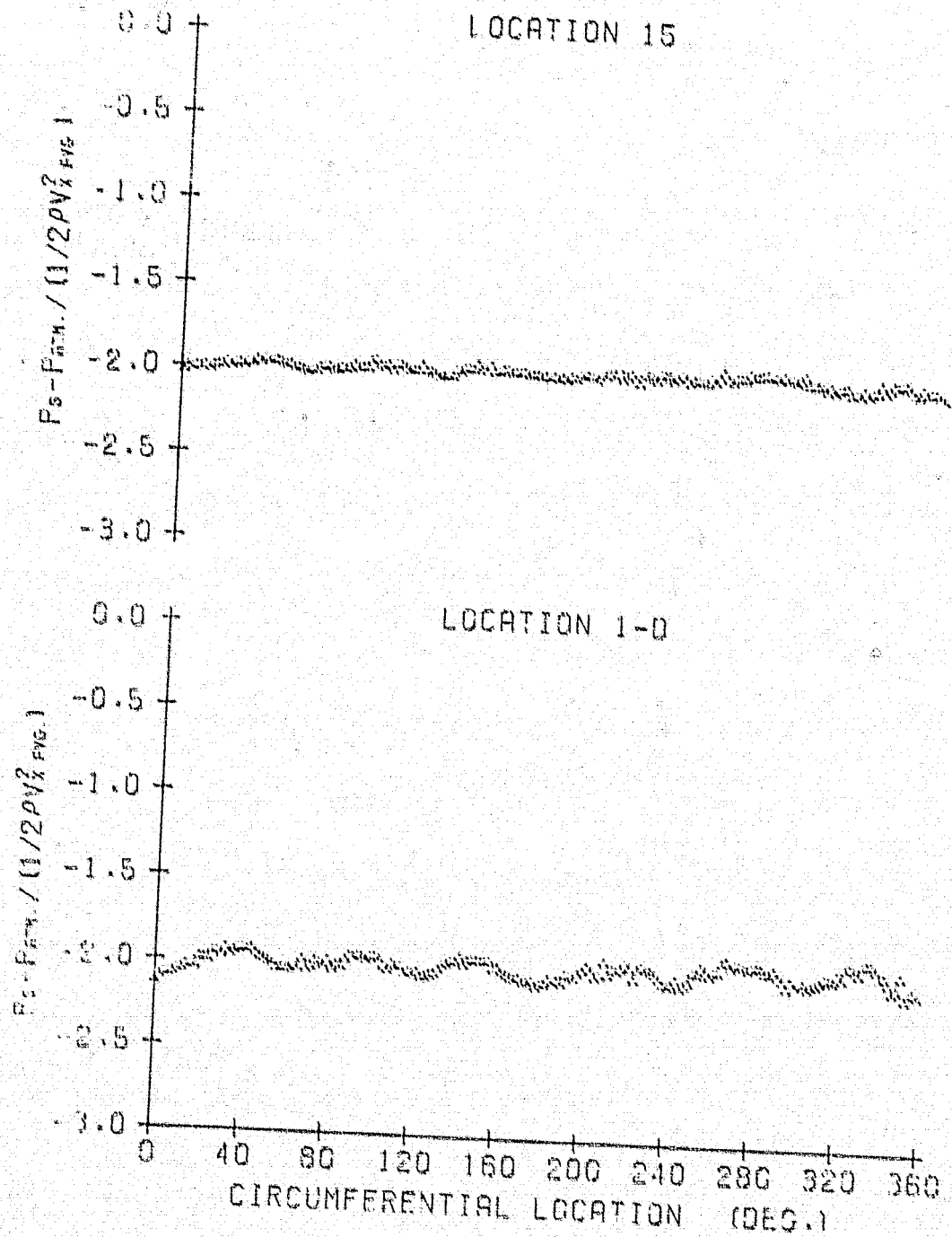


Figure E.5

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6 BLADES
35 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 714

AVG. FLOW COEF. = 1.354
AVG. P-RISE COEF. = 0.001
AVG. INCIDENCE = 1.20 DEG.

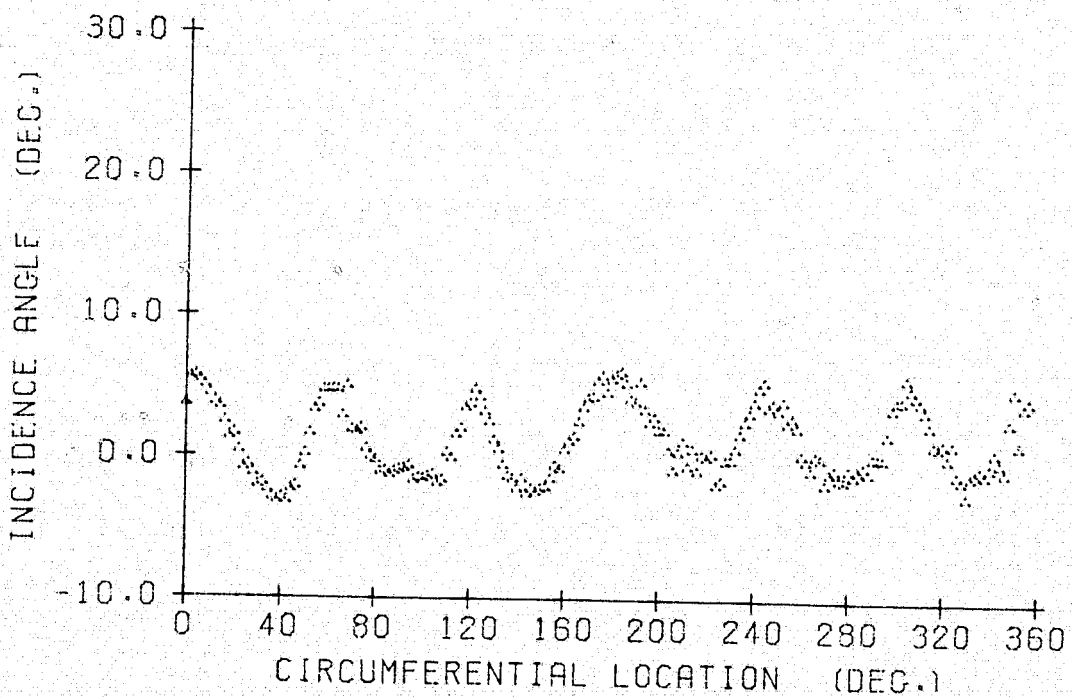


Figure E.6

6 BLADES
35 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1020

AVG. FLOW COEF. = 1.010
AVG. P-RISE COEF. = 0.424
AVG. INCIDENCE = 9.58 DEG.

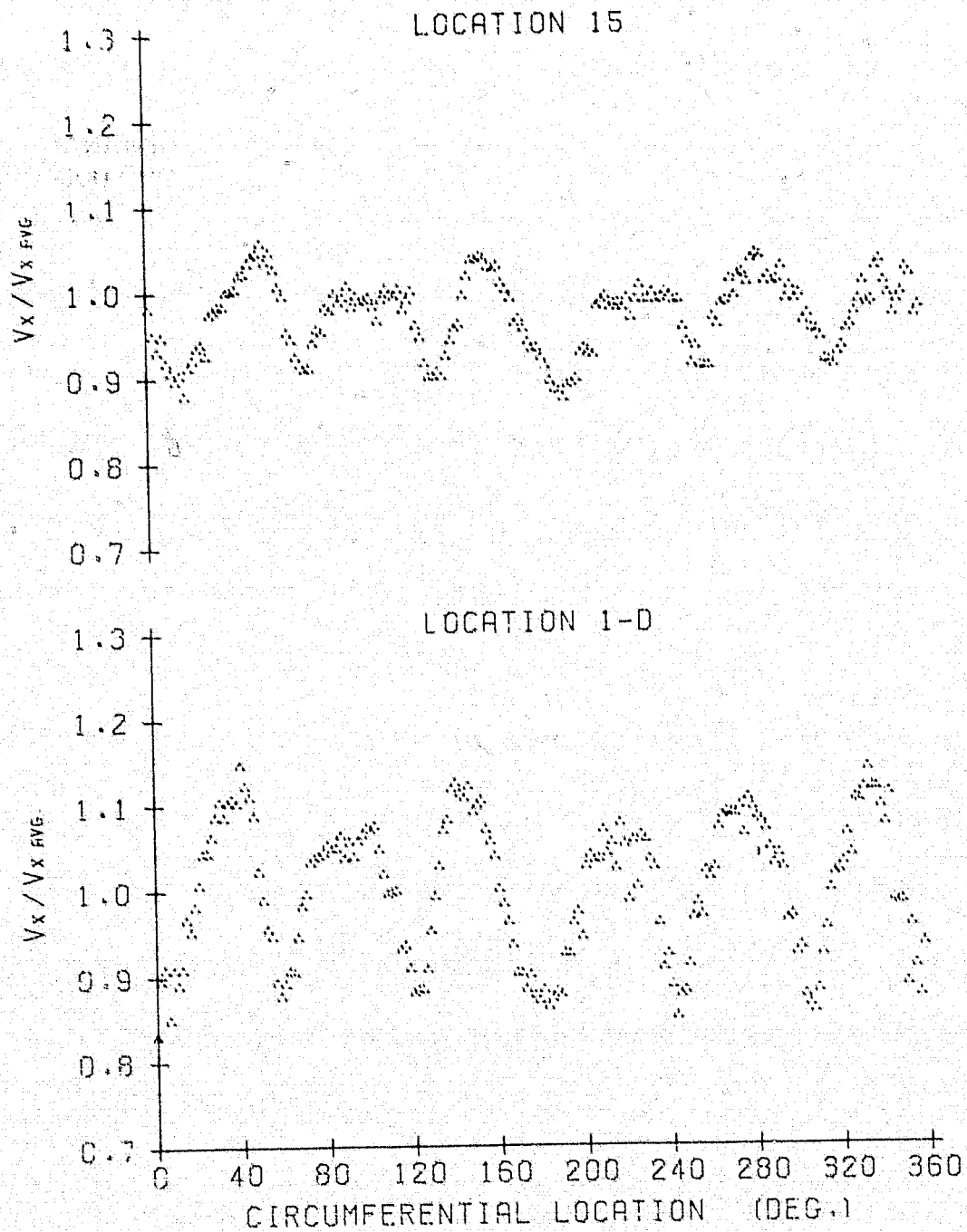


Figure E.7

10 October 1978

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6. HEADS
35 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1020

AVG. FLOW COEFF. = 1.010
AVG. P-RISE COEFF. = 0.424
AVG. INCIDENCE = 9.58 DEG.

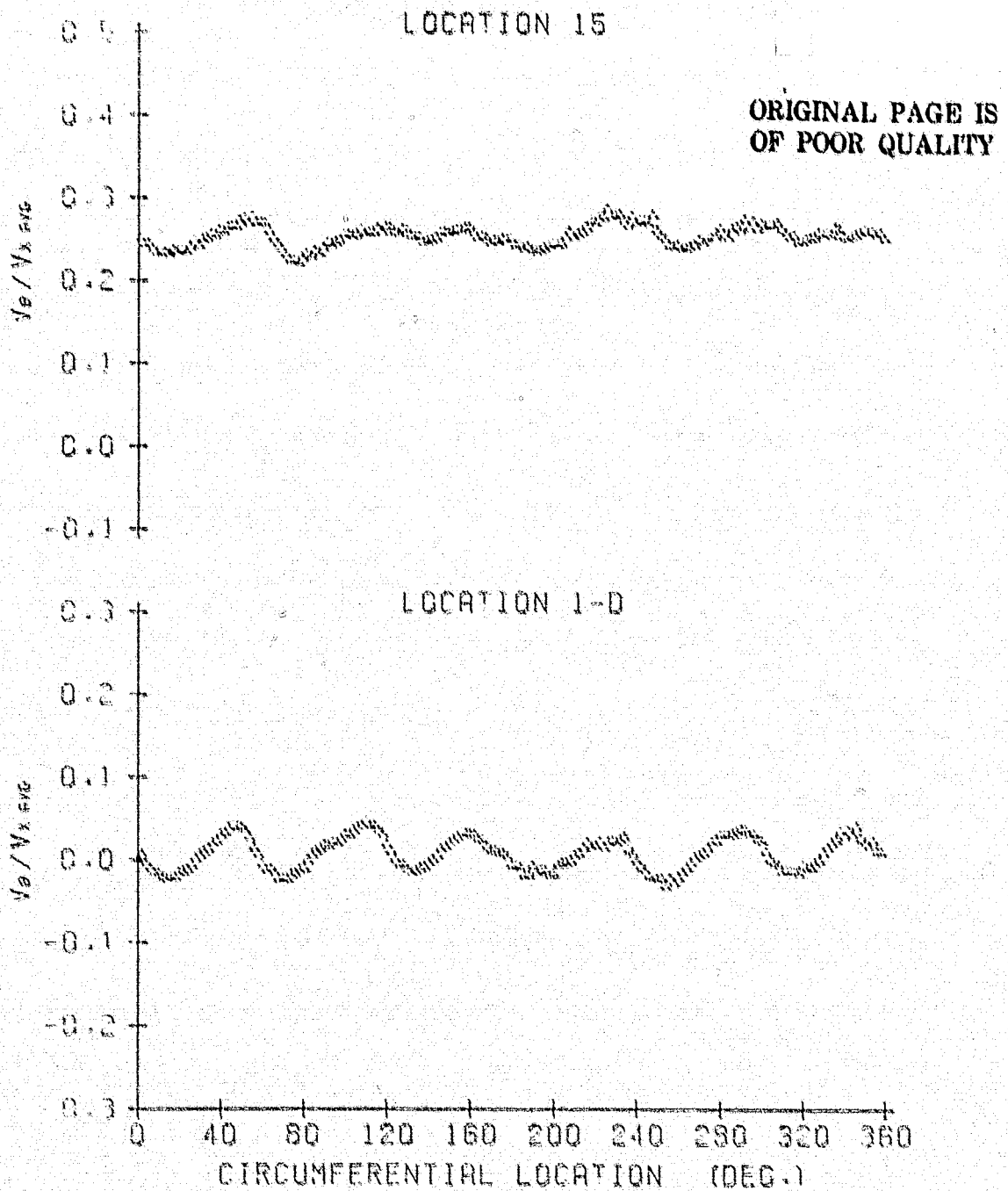


Figure E.8

10 October 1978
LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1020

AVG. FLOW COEF. = 1.010
AVG. P-RISE COEF. = 0.424
AVG. INCIDENCE = 9.58 DEG.

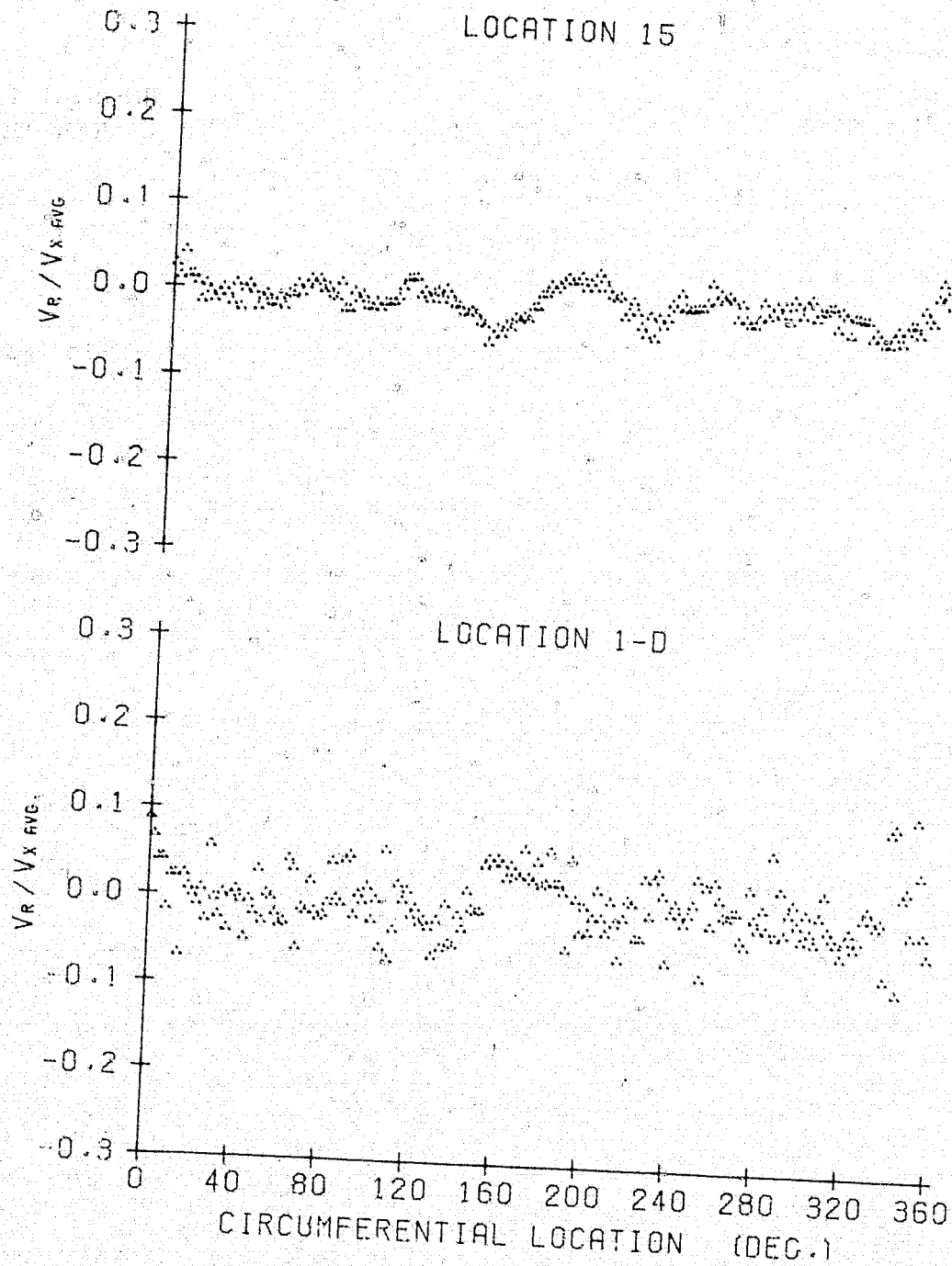


Figure E.9

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5 BLADES
35 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM : 1020

AVG. FLOW COEF. = 1.010
AVG. P-RISE COEF. = 0.424
AVG. INCIDENCE = 9.58 DEG.

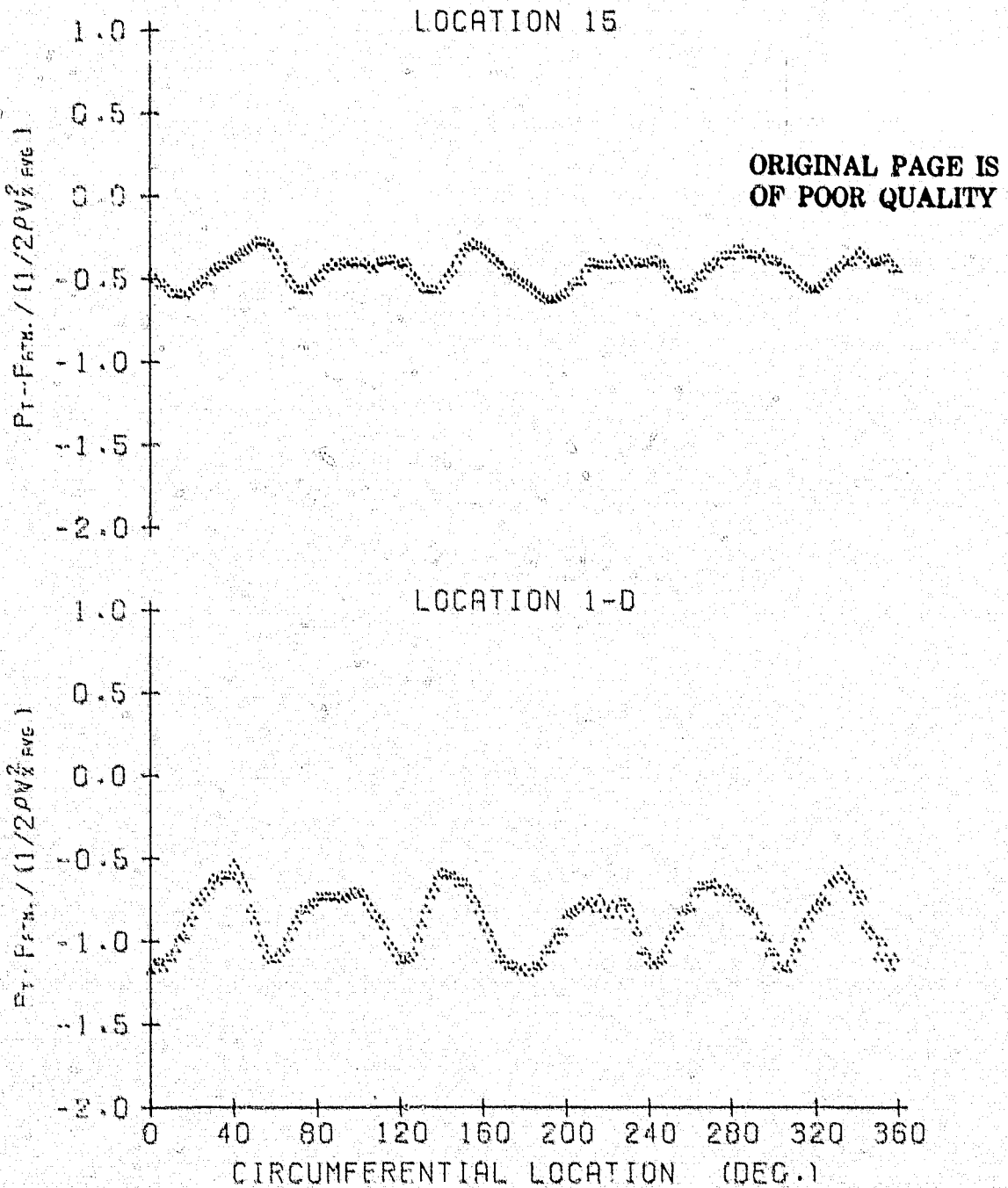


Figure E.10

10 October 1978
LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1020

AVG. FLOW COEFF. = 1.010
AVG. P-RISE COEF. = 0.424
AVG. INCIDENCE = 9.58 DEG.

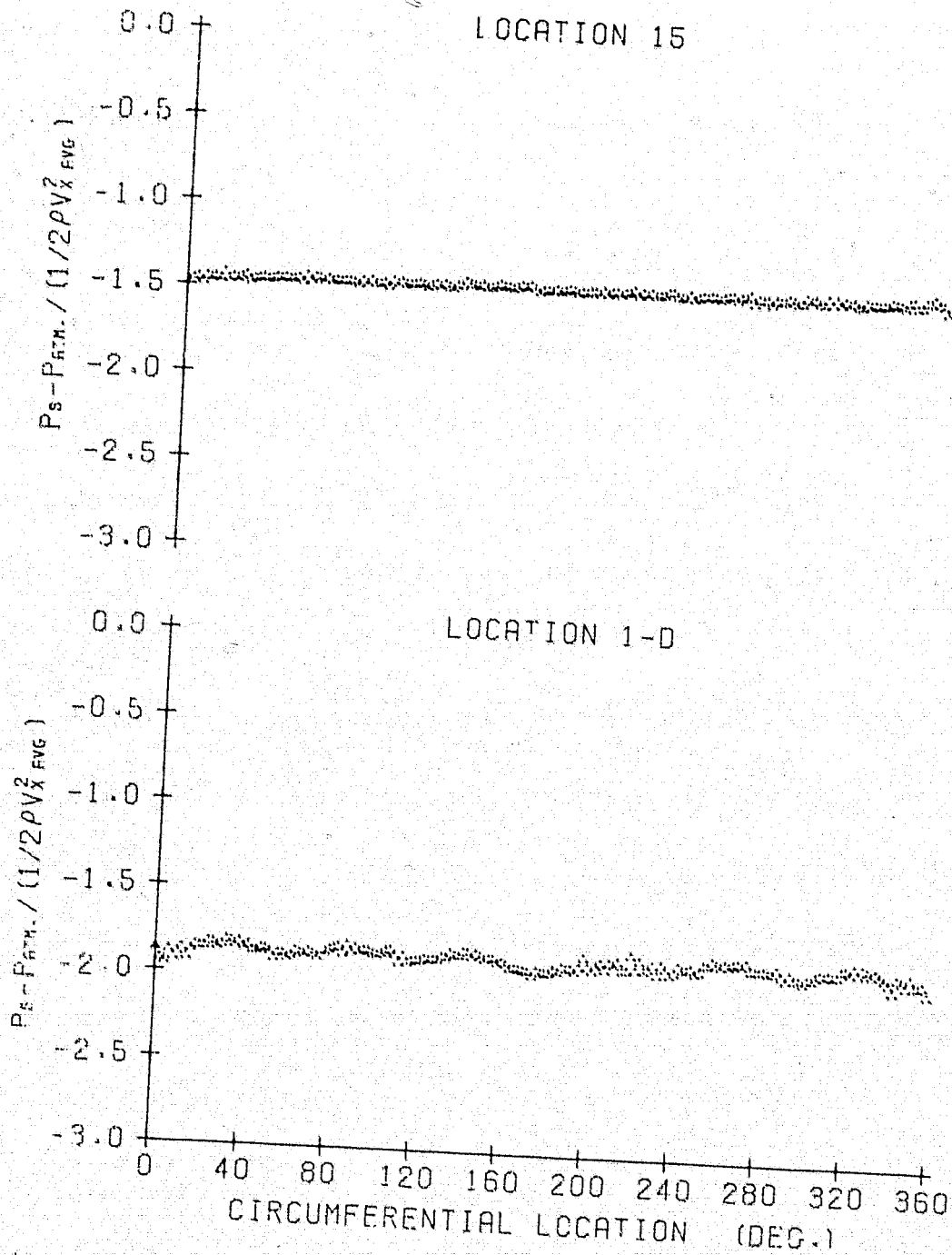


Figure E.11

10 October 1978
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6 BLADES
35 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1020

AVG. FLOW COEF. = 1.010
AVG. P-RISE COEF. = 0.424
AVG. INCIDENCE = 9.58 DEG.

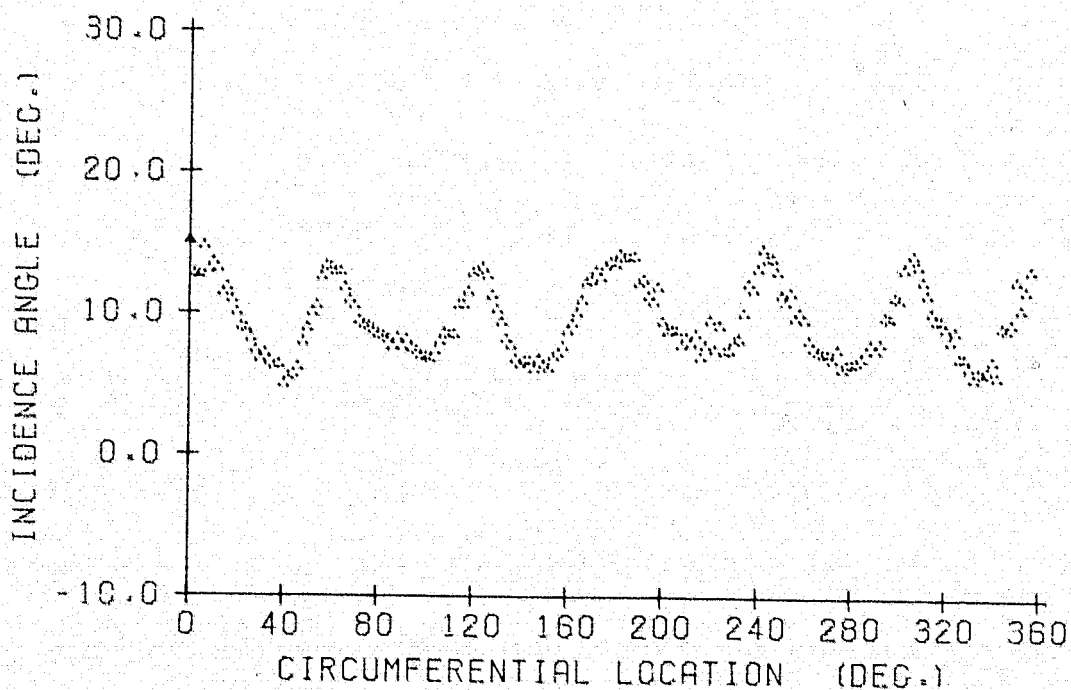


Figure E.12

10 October 1978

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6 BLADES
35 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1260

AVG. FLOW COEF. = 0.814
AVG. P-RISE COEF. = 0.911
AVG. INCIDENCE = 15.79 DEG.

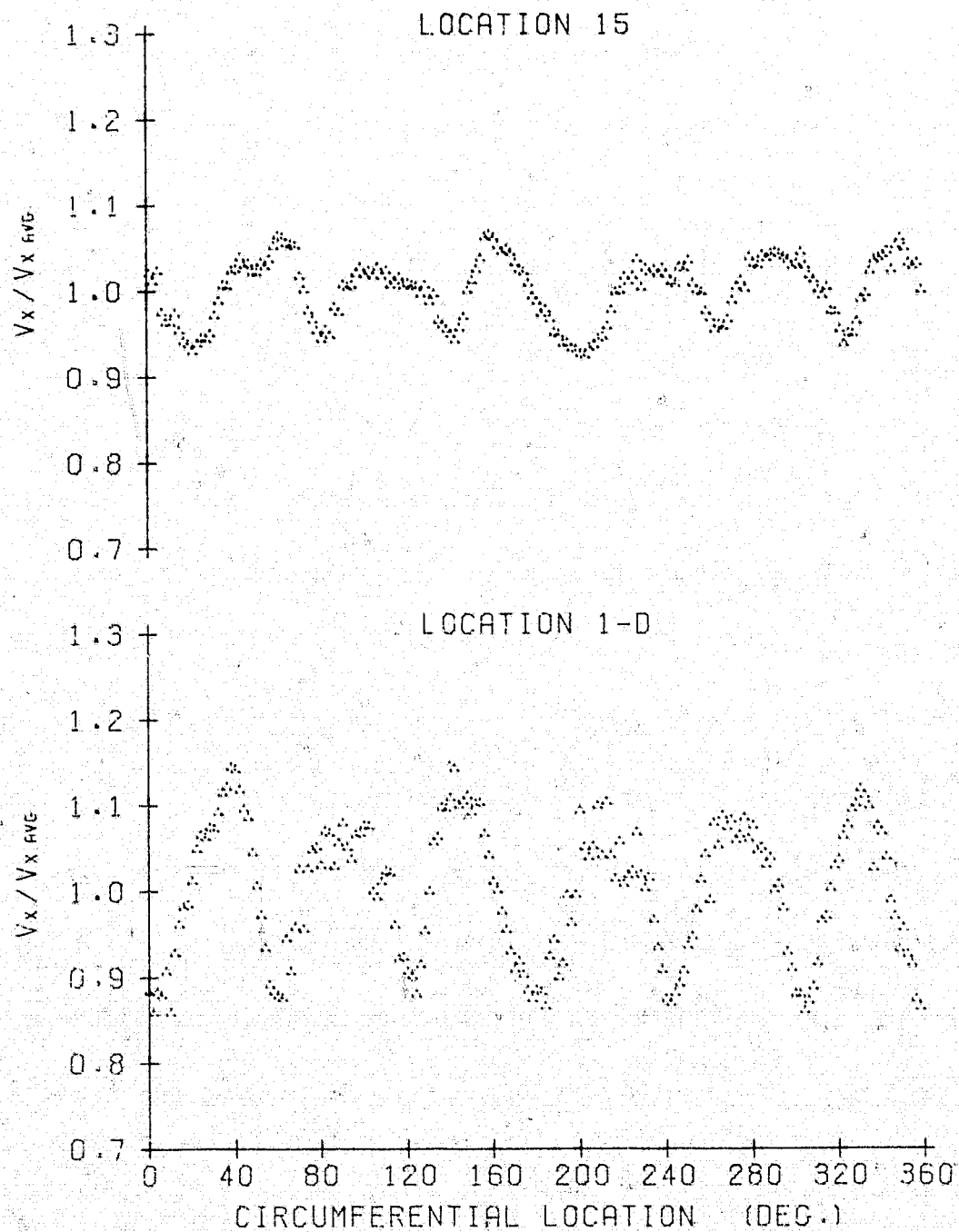


Figure E.13

10 October 1978
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6 BLADES
35 DEG. STAGGER ANGLE
5 CYCLE DISTORTION
RPM = 1260

AVG. FLOW COEF. = 0.814
AVG. P-RISE COEF. = 0.911
AVG. INCIDENCE = 15.79 DEG.

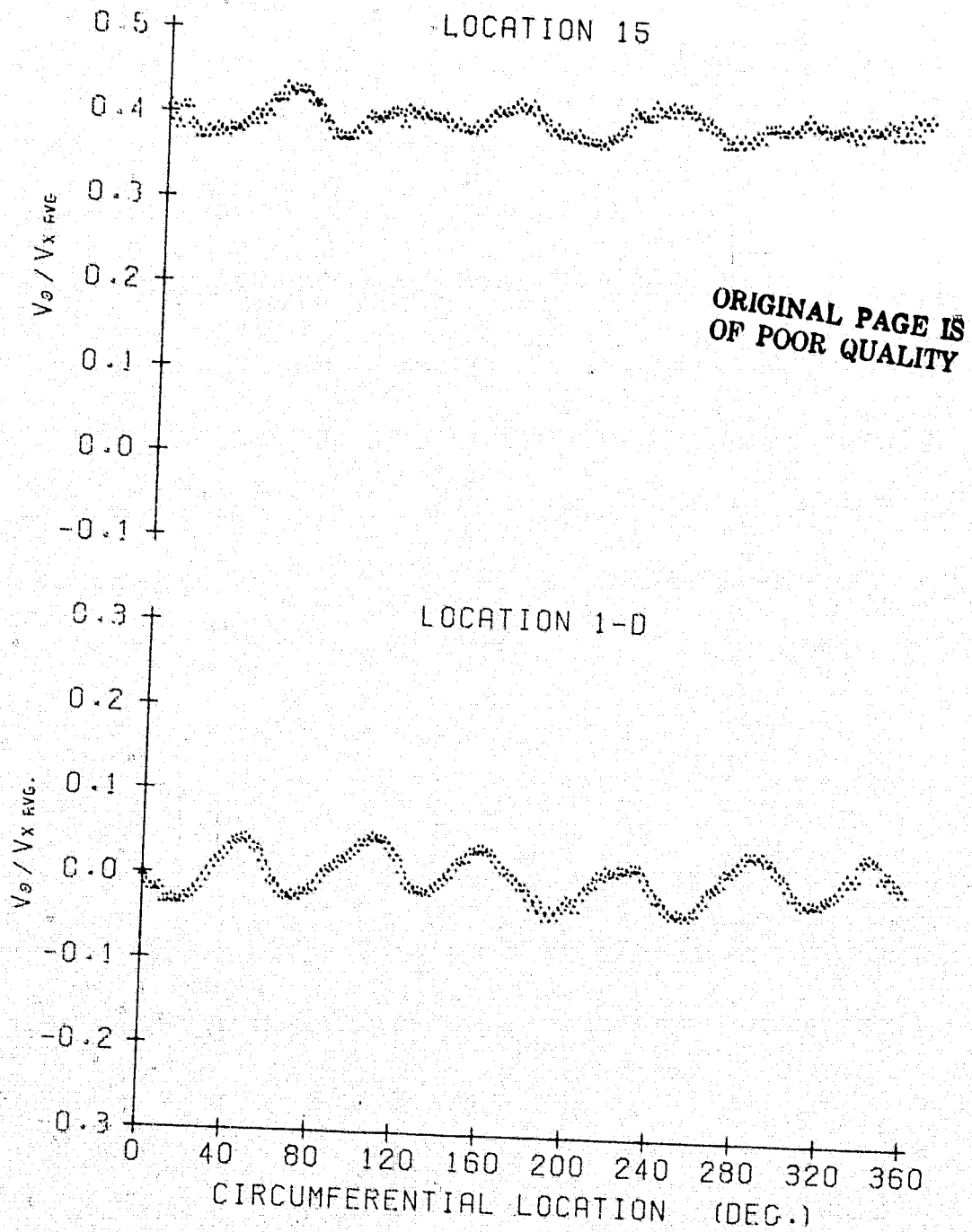


Figure E.14

10 October 1978

LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1260

AVG. FLOW COEF. = 0.814
AVG. P-RISE COEF. = 0.911
AVG. INCIDENCE = 15.79 DEG.

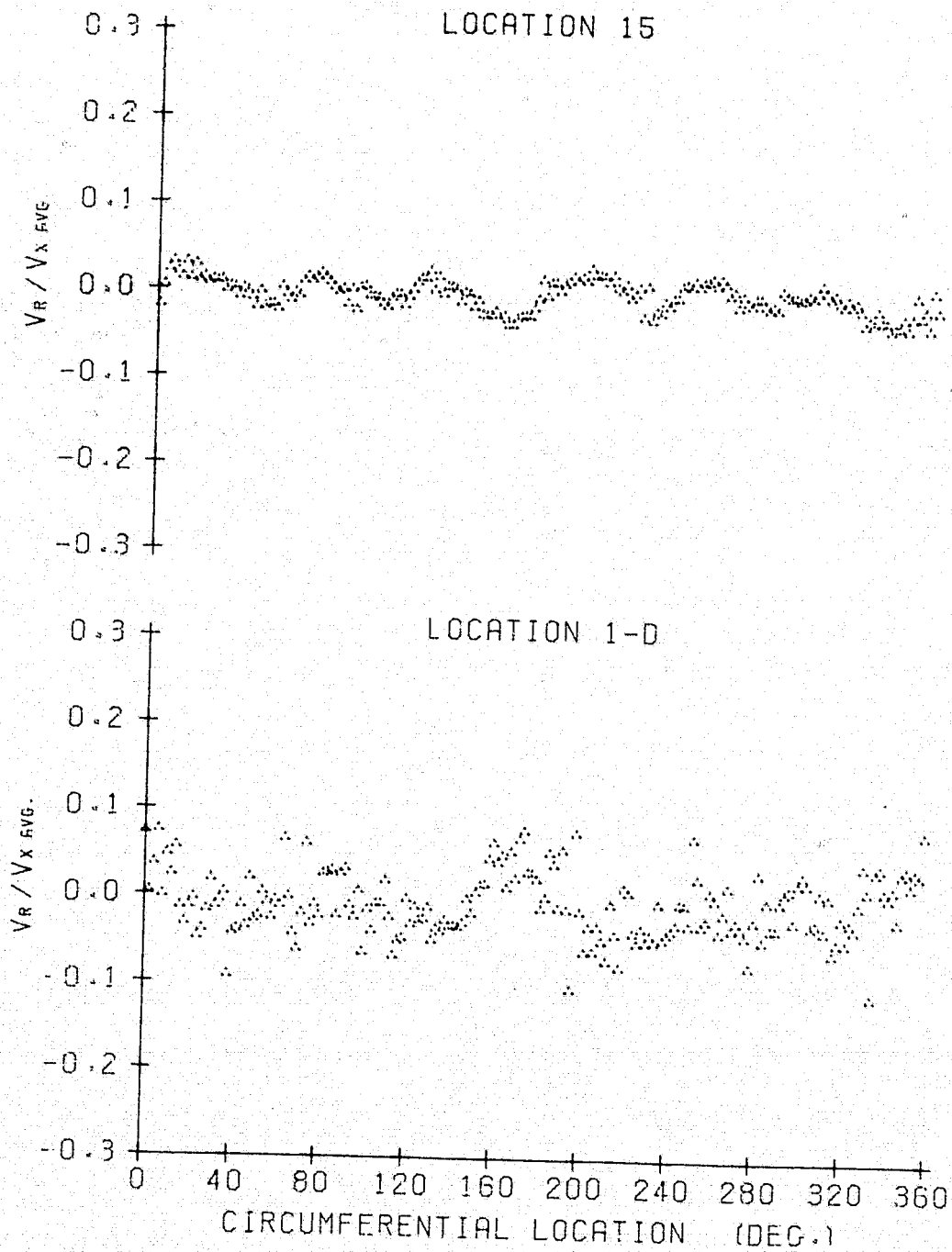


Figure E.15

6 BLADES
35 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1260

AVG. FLOW COEF. = 0.814
AVG. P-RISE COEF. = 0.911
AVG. INCIDENCE = 15.79 DEG.

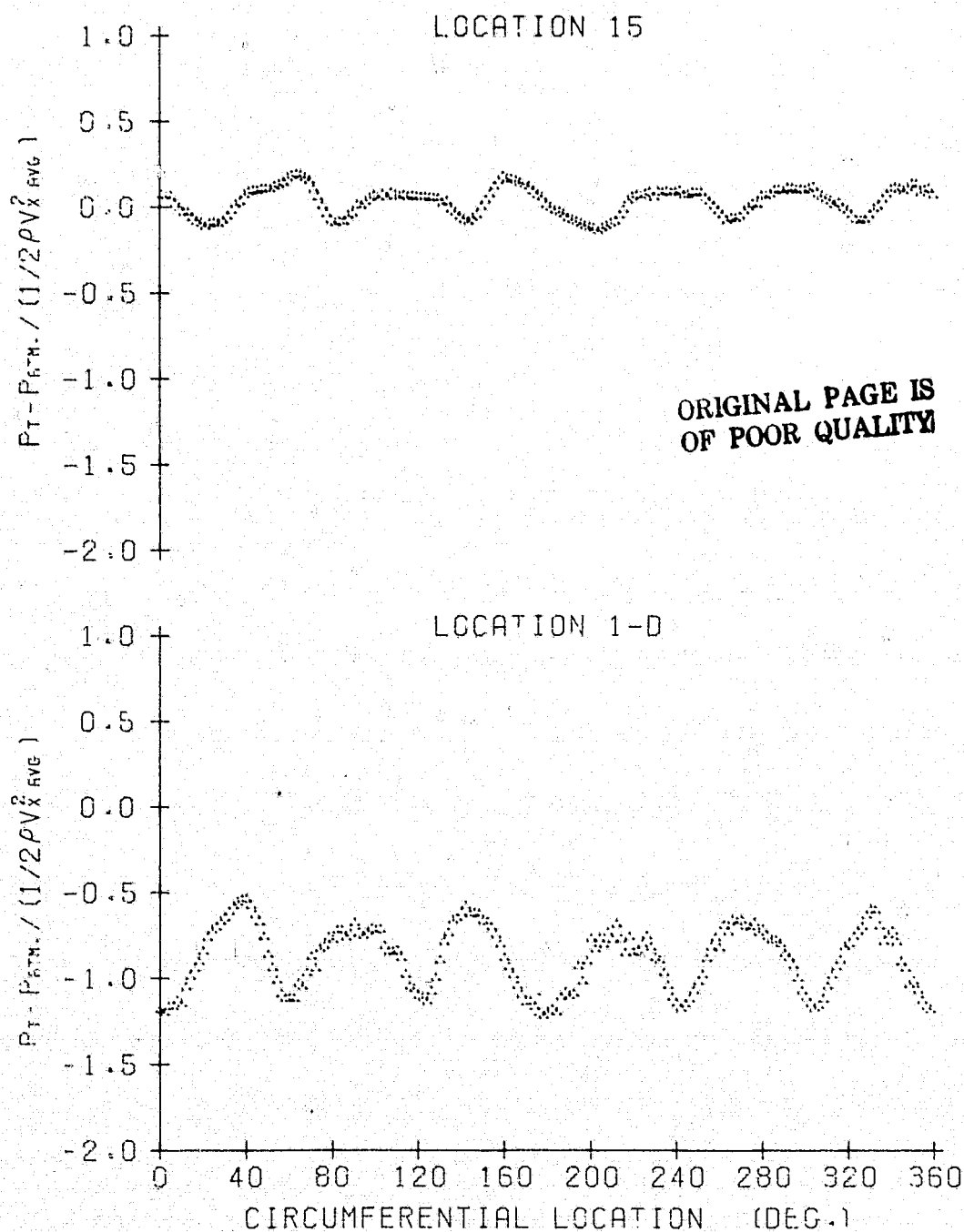


Figure E.16

10 October 1978
LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1260

AVG. FLOW COEF. = 0.814
AVG. P-RISE COEF. = 0.911
AVG. INCIDENCE = 15.79 DEG.

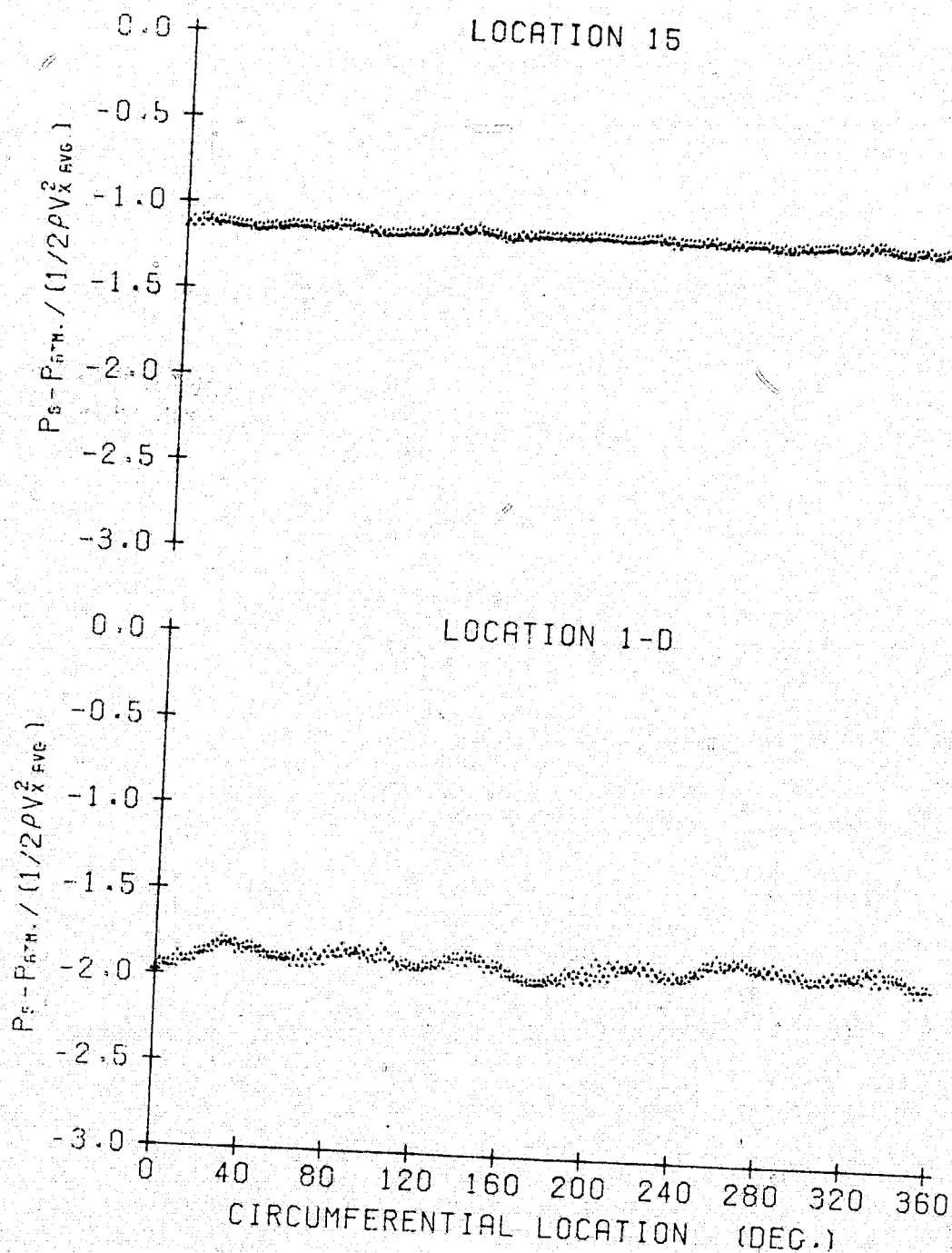


Figure E.17

10 October 1978

LCB:jep

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6 BLADES
35 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1260

AVG. FLOW COEF. = 0.814
AVG. P-RISE COEF. = 0.911
AVG. INCIDENCE = 15.79 DEG.

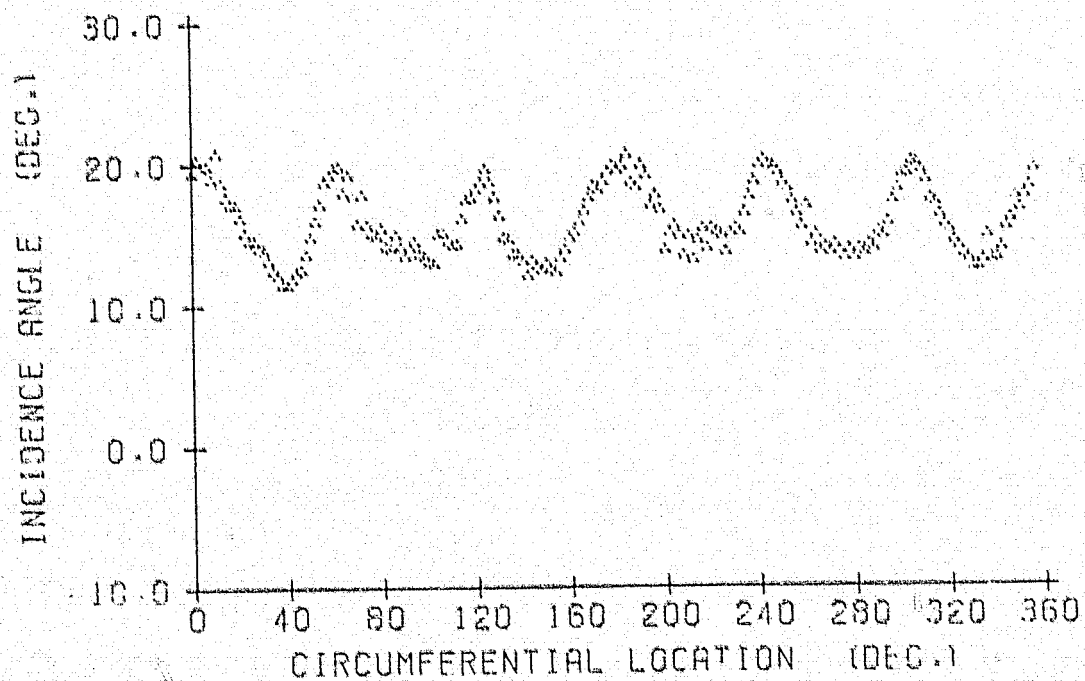


Figure E.18

10 October 1978
LCB:jep

6 BLADES
45 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1020

AVG. FLOW COEF. = 0.971
AVG. P-RISE COEF. = 0.029
AVG. INCIDENCE = 0.76 DEG.

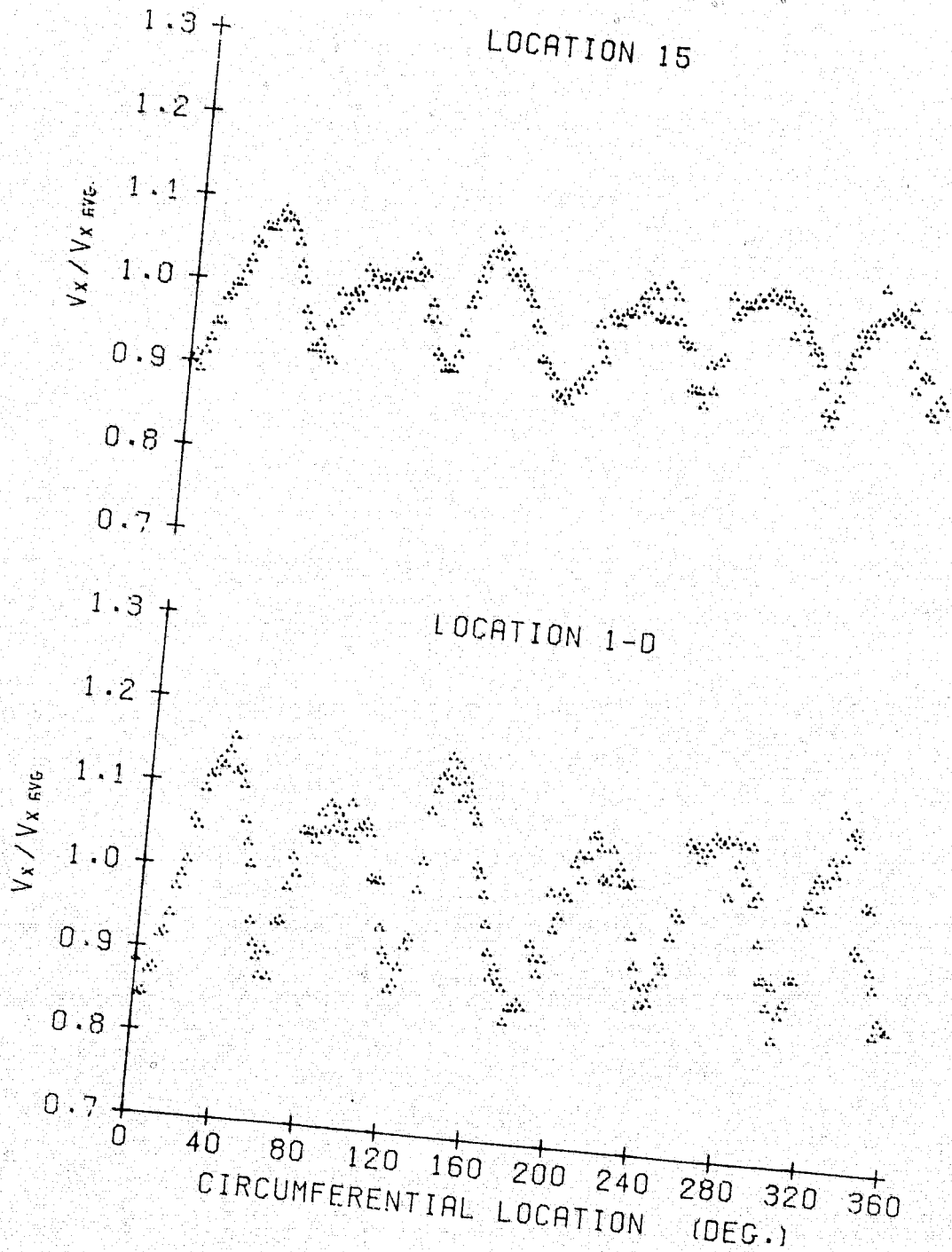


Figure E.19

10 October 1978
LCB:jep

6 BLADES
45 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1020

AVG. FLOW COEF. = 0.971
AVG. P-RISE COEF. = 0.029
AVG. INCIDENCE = 0.76 DEG.

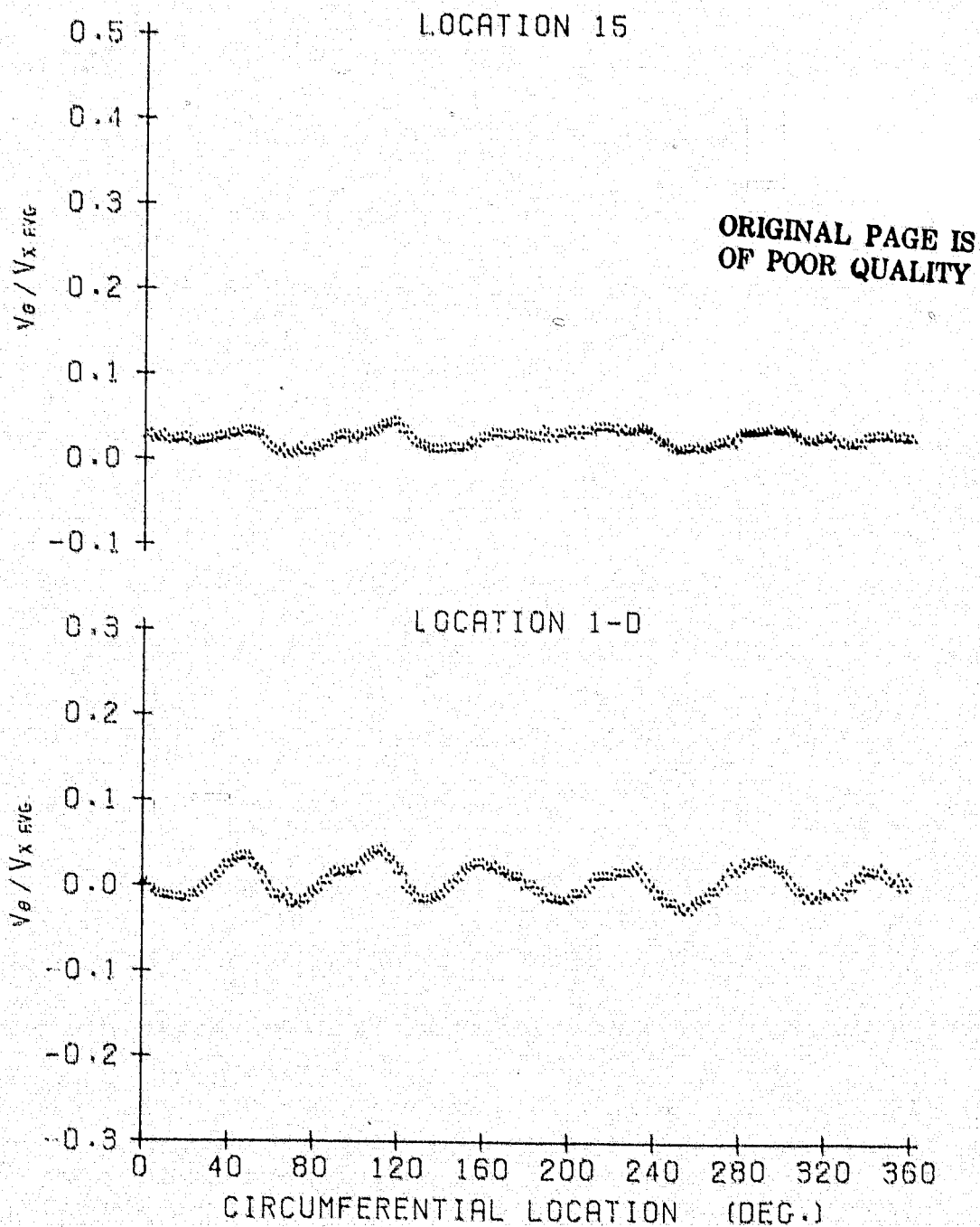


Figure E.20

10 October 1978
LCB:jep

6 BLADES
45 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1020

AVG. FLOW COEFF. = 0.971
AVG. P-RISE COEF. = 0.029
AVG. INCIDENCE = 0.76 DEG.

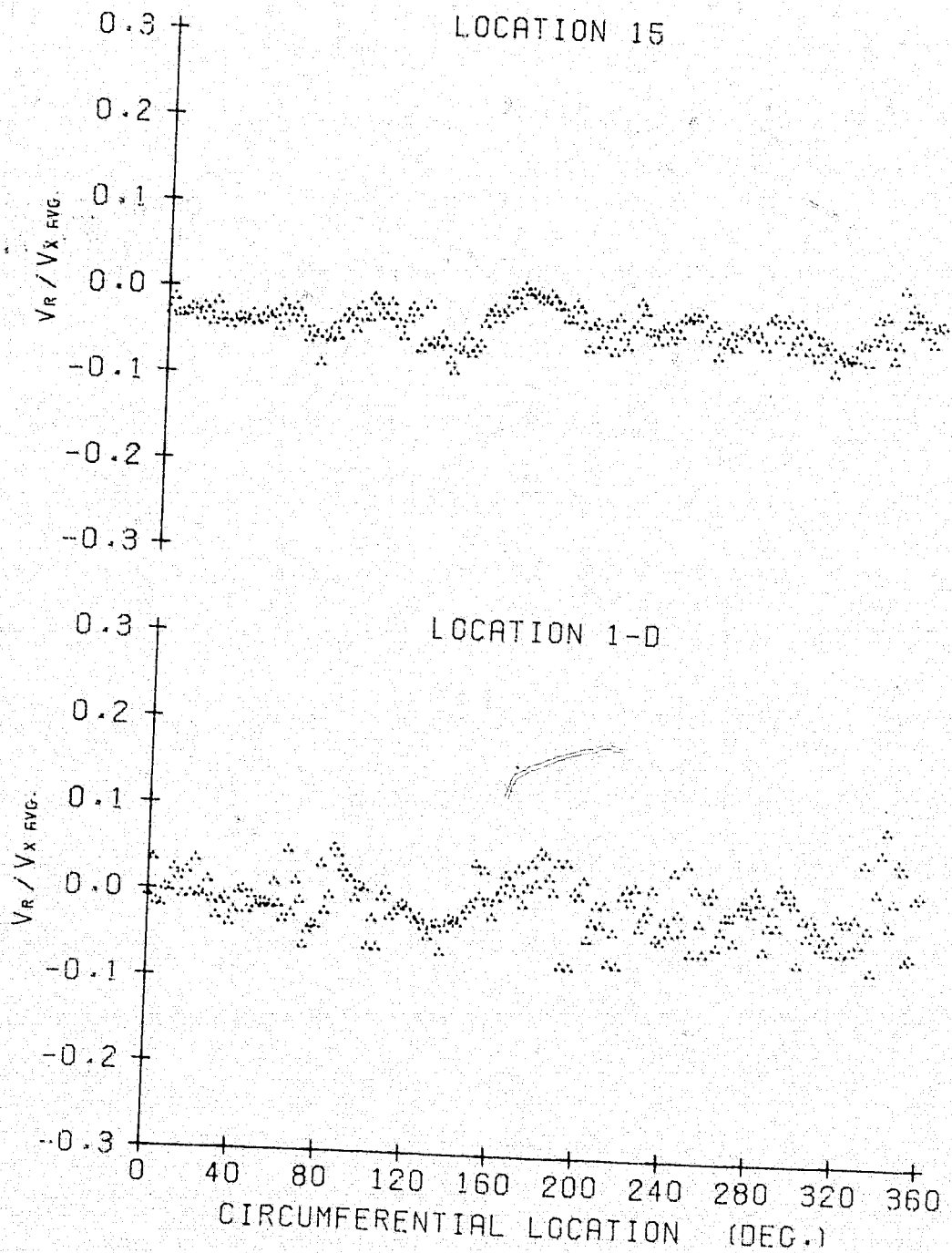


Figure E.21

10 October 1978
LCB:jep

6 BLADES
45 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1020

AVG. FLOW COEF. = 0.971
AVG. P-RISE COEF. = 0.029
AVG. INCIDENCE = 0.76 DEG.

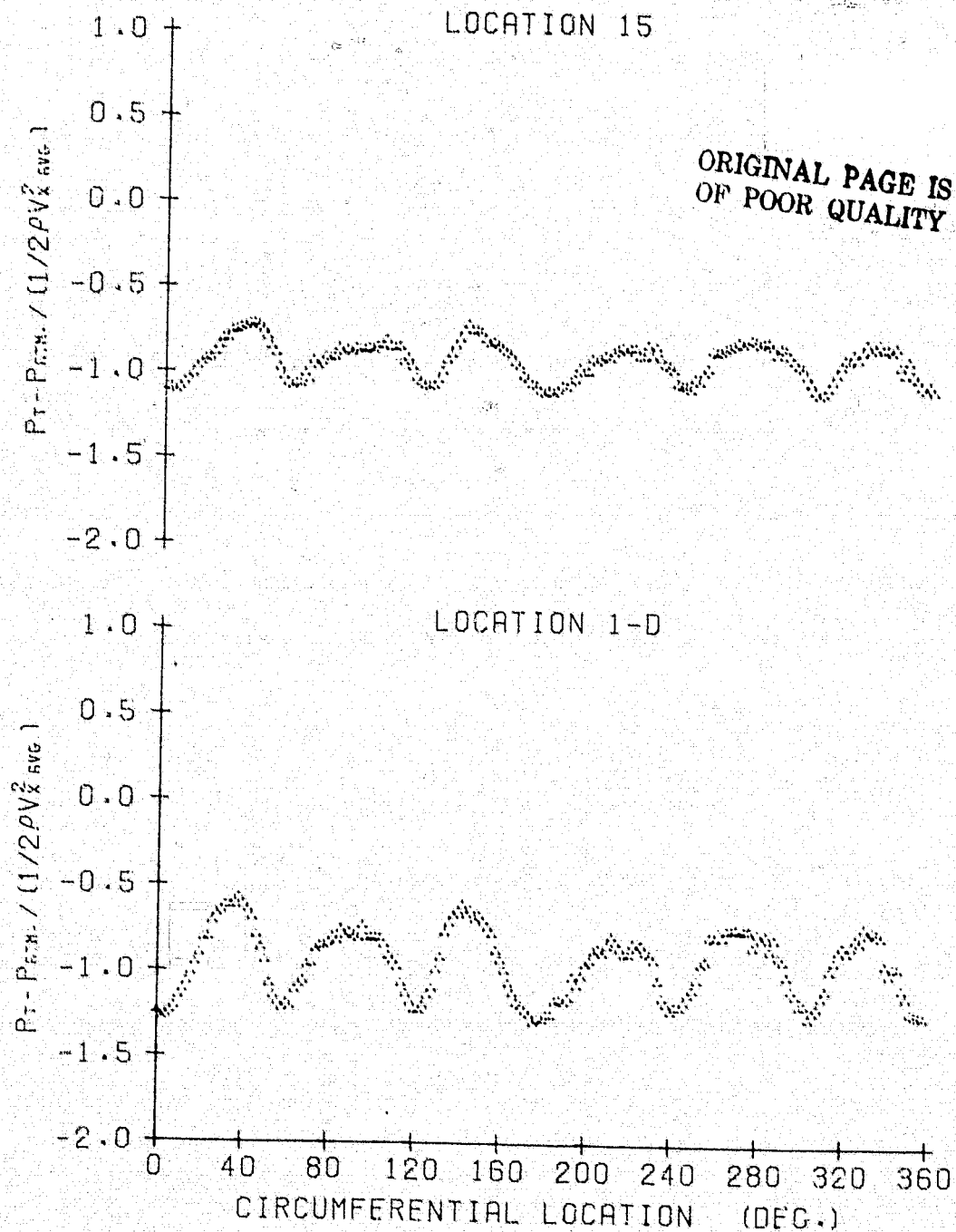


Figure E.22

10 October 1978
LCB:jep

6 BLADES
45 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1020

AVG. FLOW COEF. = 0.971
AVG. P-RISE COEF. = 0.029
AVG. INCIDENCE = 0.76 DEG.

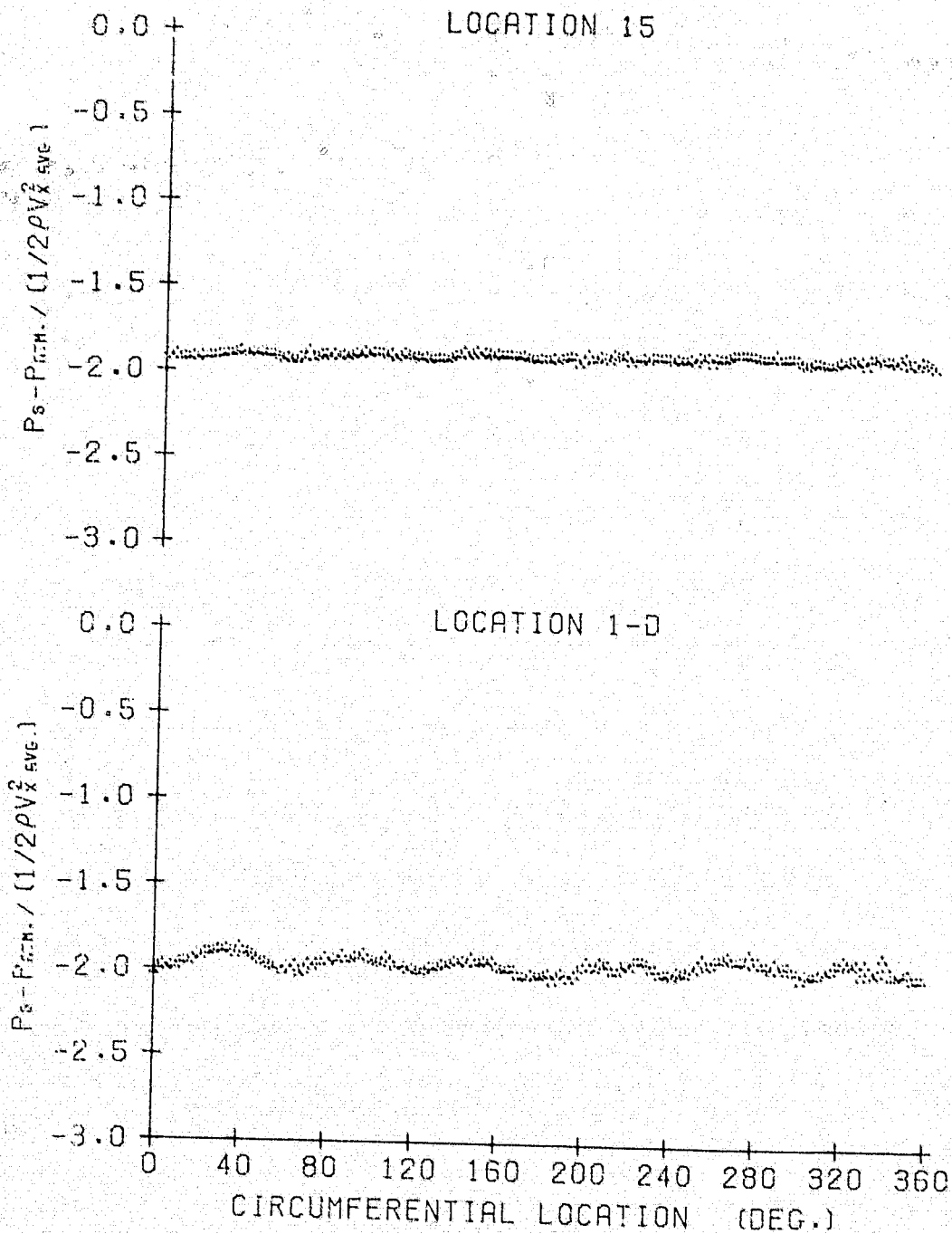


Figure E.23

10 October 1978
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6 BLADES
45 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1020

AVG. FLOW COEF. = 0.971
AVG. P-RISE COEF. = 0.029
AVG. INCIDENCE = 0.76 DEG.

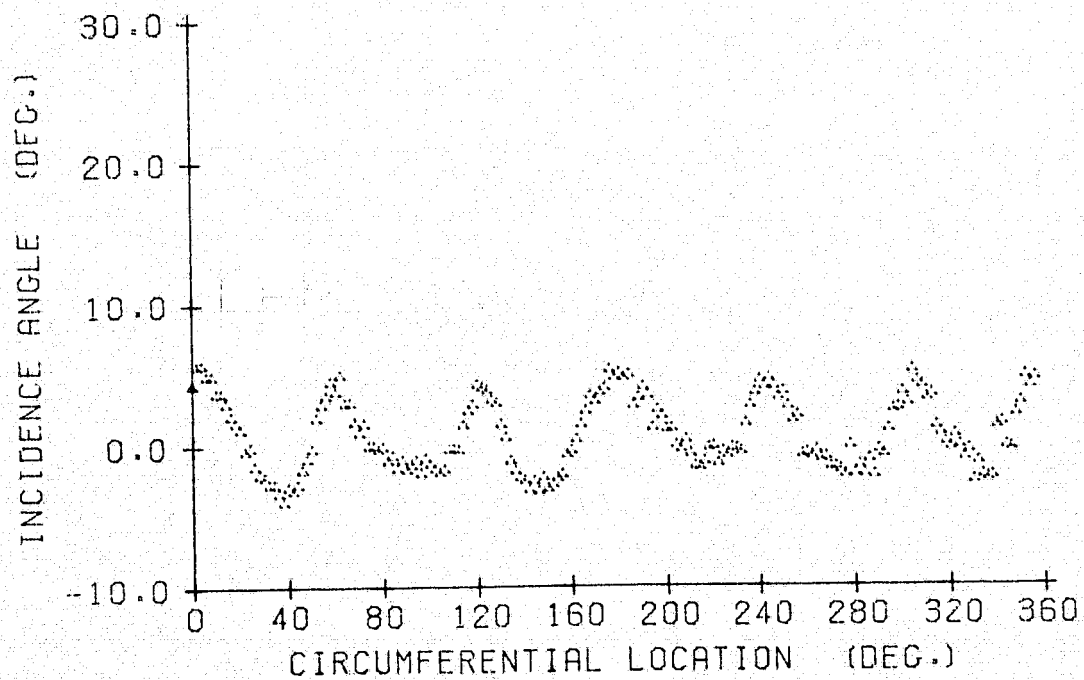


Figure E.24

10 October 1978

LCB:jep

6 BLADES
45 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1413

AVG. FLOW COEF. = 0.696
AVG. P-RISE COEF. = 0.851
AVG. INCIDENCE = 10.13 DEG.

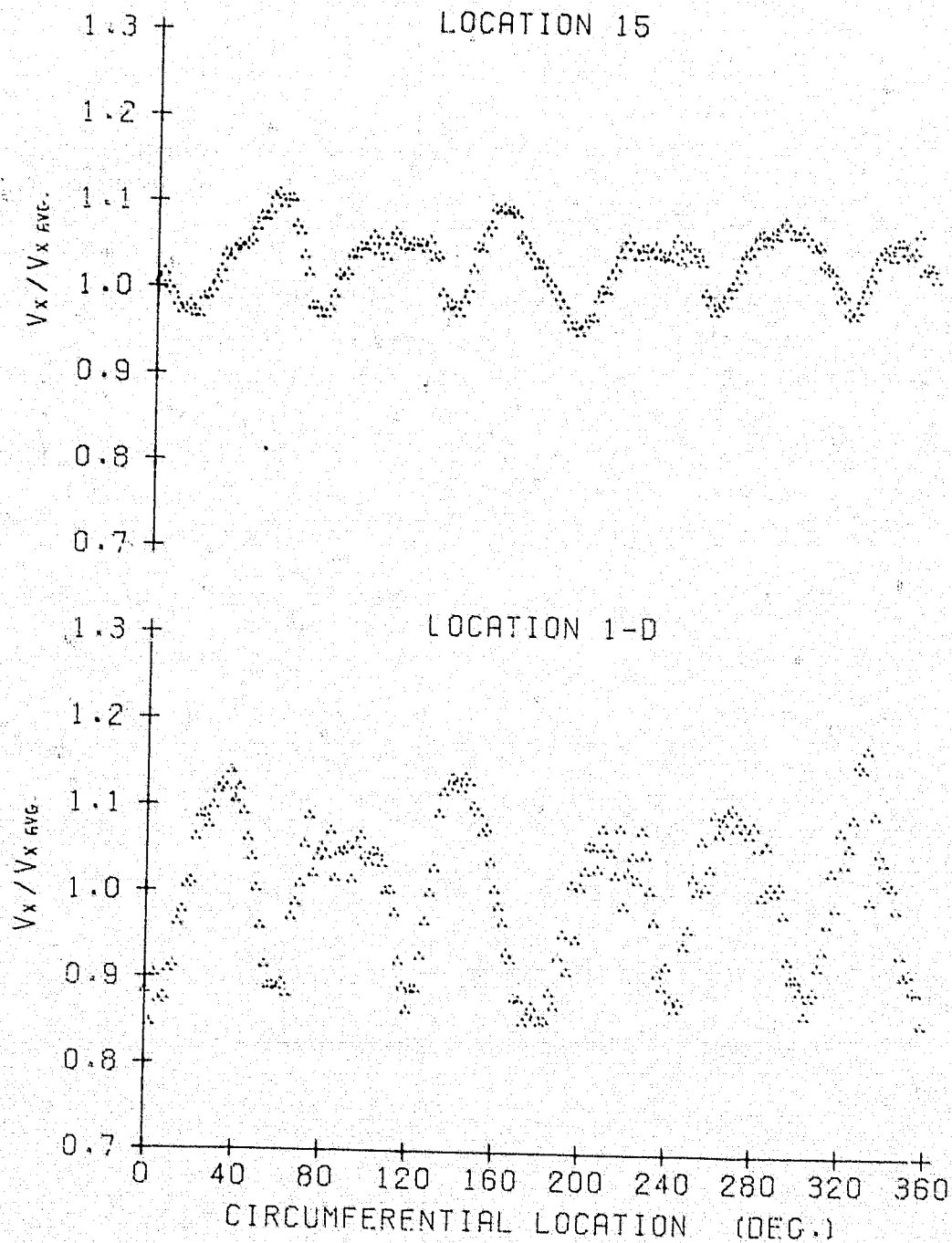


Figure E.25

10 October 1978
LCB:jep

6 BLADES
45 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1413

AVG. FLOW COEF. = 0.696
AVG. P-RISE COEF. = 0.851
AVG. INCIDENCE = 10.13 DEG.

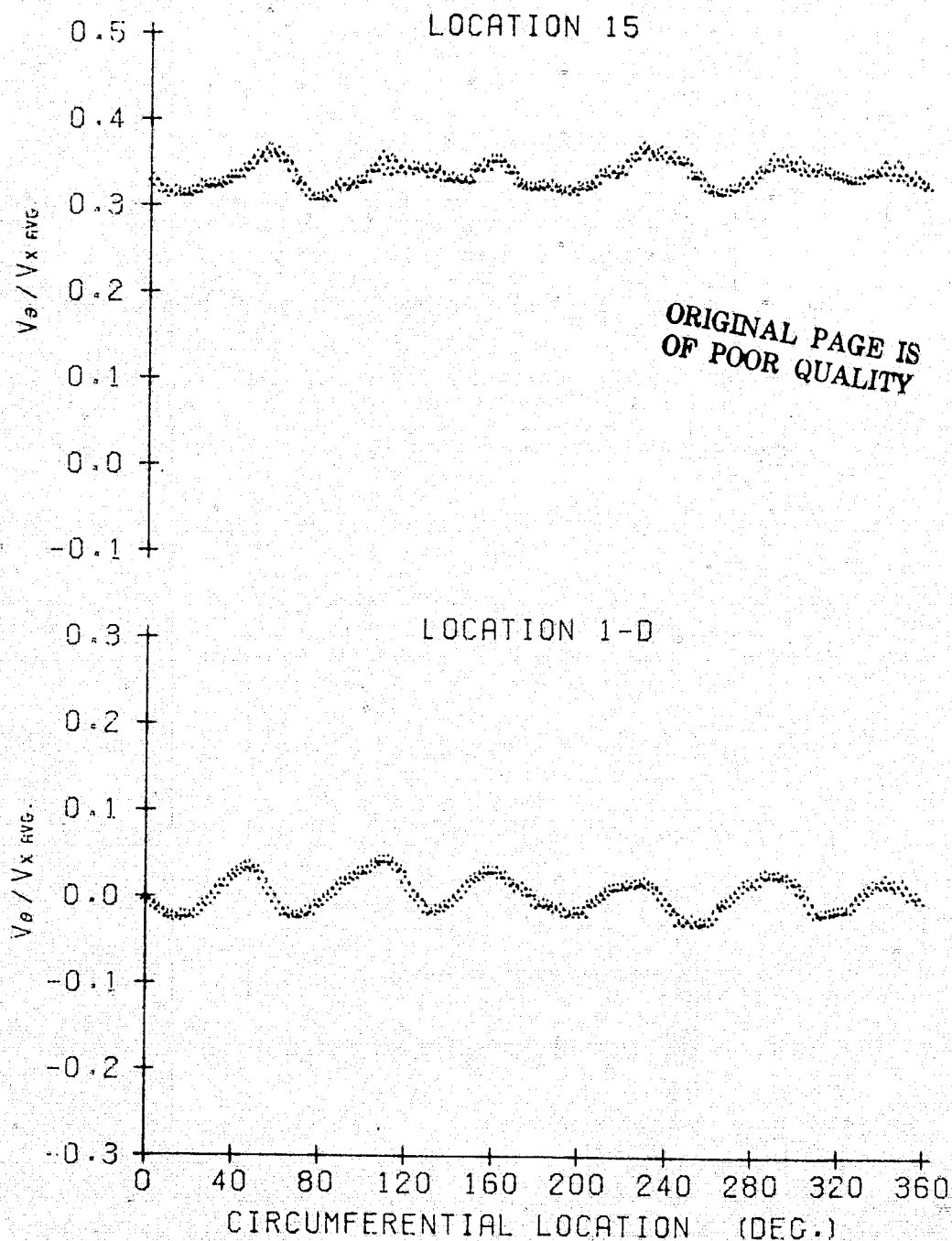


Figure E.26

10 October 1978
LCB:jep

6 BLADES
45 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1413

AVG. FLOW COEF. = 0.696
AVG. P-RISE COEF. = 0.851
AVG. INCIDENCE = 10.13 DEG.

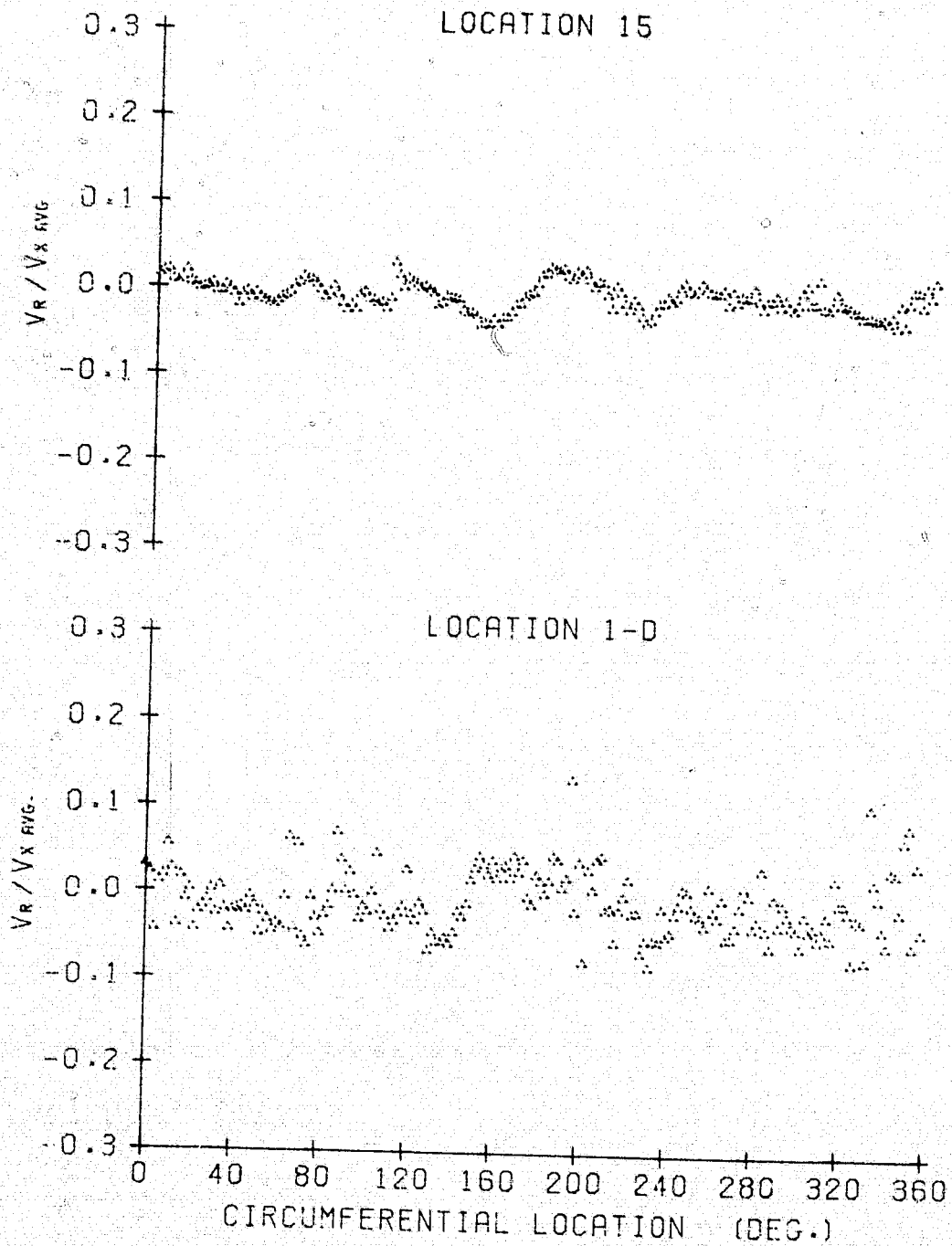


Figure E.27

10 October 1978
LCB:jep

6 BLADES
45 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1413

AVG. FLOW COEF. = 0.696
AVG. P-RISE COEF. = 0.851
AVG. INCIDENCE = 10.13 DEG.

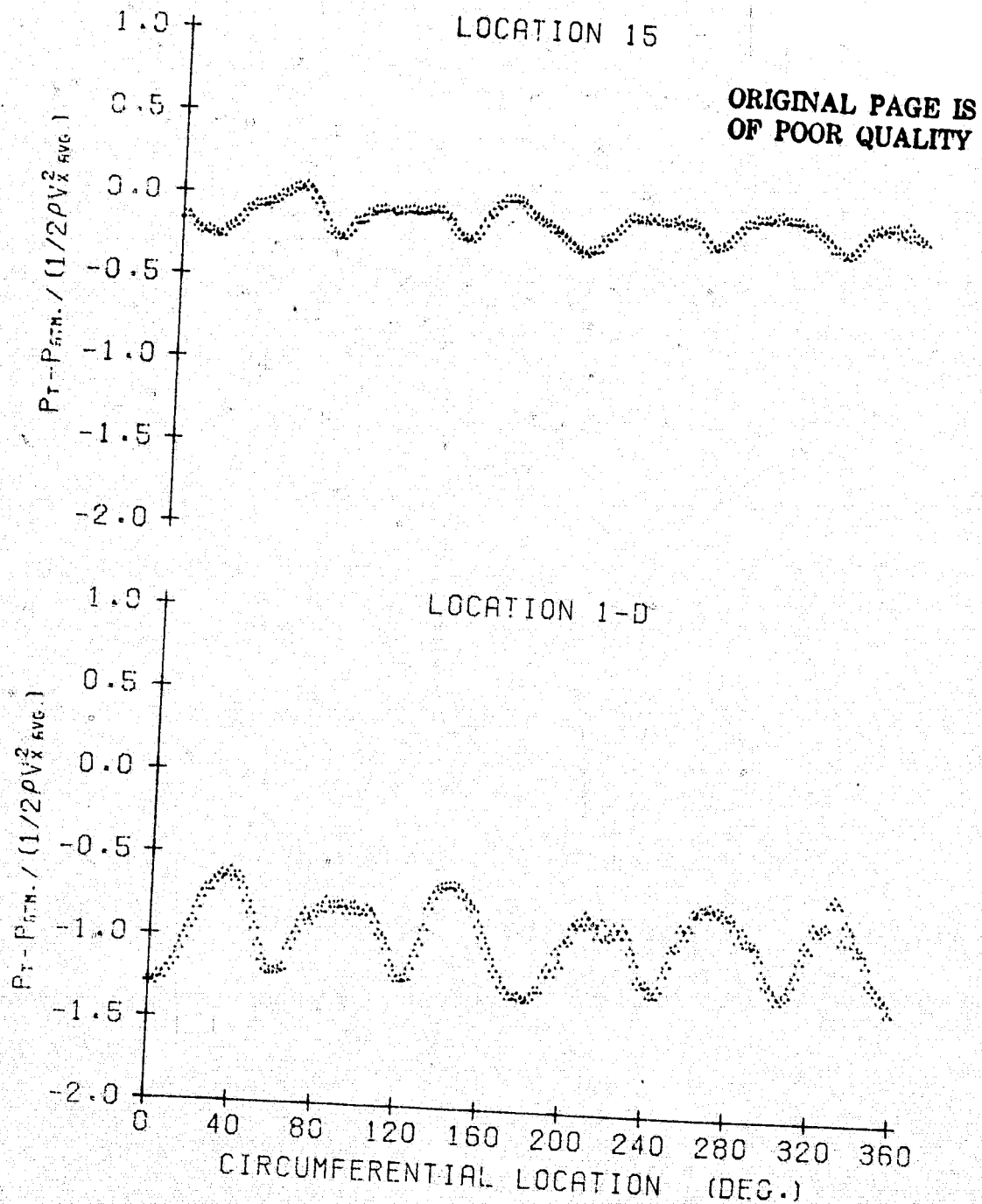


Figure E.28

10 October 1978
LCB:jep

6 BLADES
45 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1413

AVG. FLOW COEF. = 0.696
AVG. P-RISE COEF. = 0.851
AVG. INCIDENCE = 10.13 DEG.

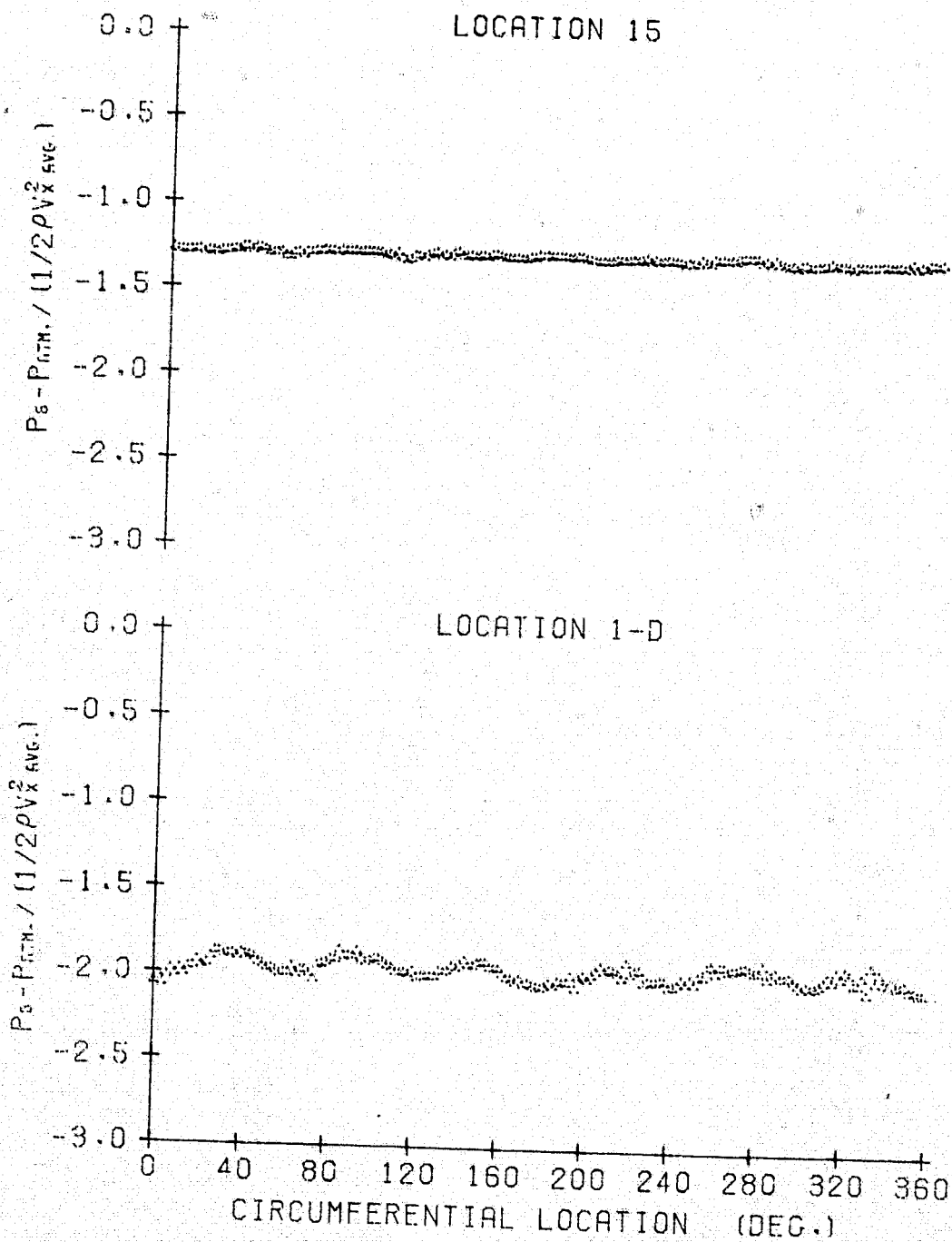


Figure E.29

10 October 1978
LCB:jep

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6 BLADES
45 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1413

AVG. FLOW COEF. = 0.696
AVG. P-RISE COEF. = 0.851
AVG. INCIDENCE = 10.13 DEG.

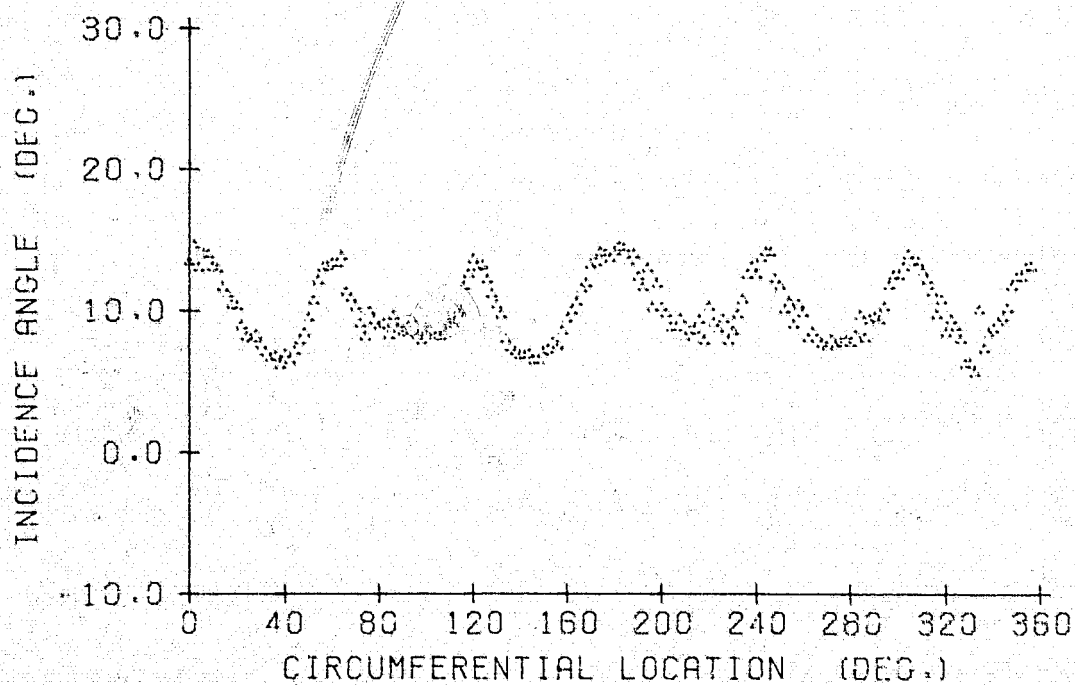


Figure E.30

10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1457

AVG. FLOW COEF. = 0.679
AVG. P-RISE COEF. = 0.131
AVG. INCIDENCE = 0.19 DEG.

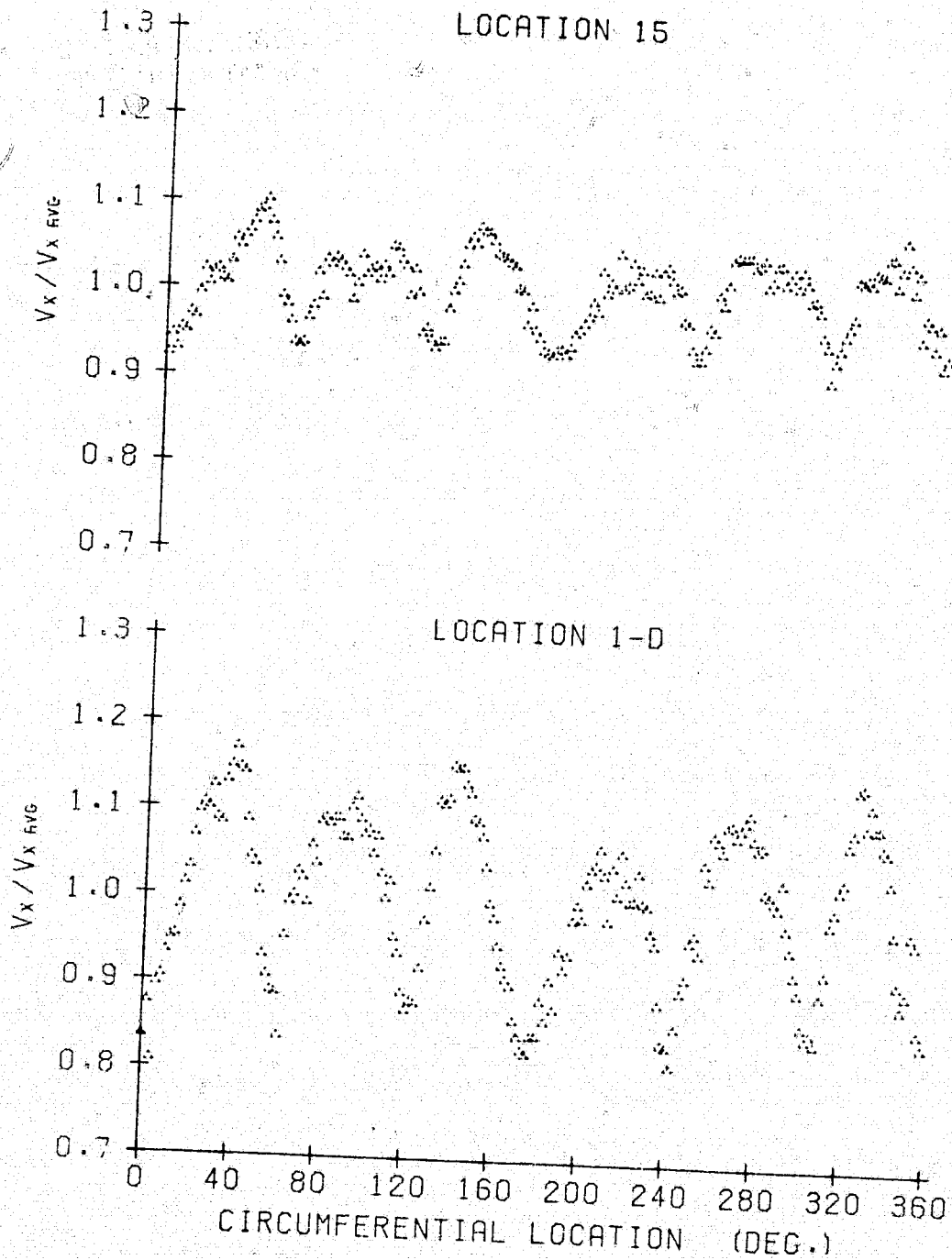


Figure E.31

10 October 1978

LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1457

AVG. FLOW COEF. = 0.679
AVG. P-RISE COEF. = 0.131
AVG. INCIDENCE = 0.19 DEG.

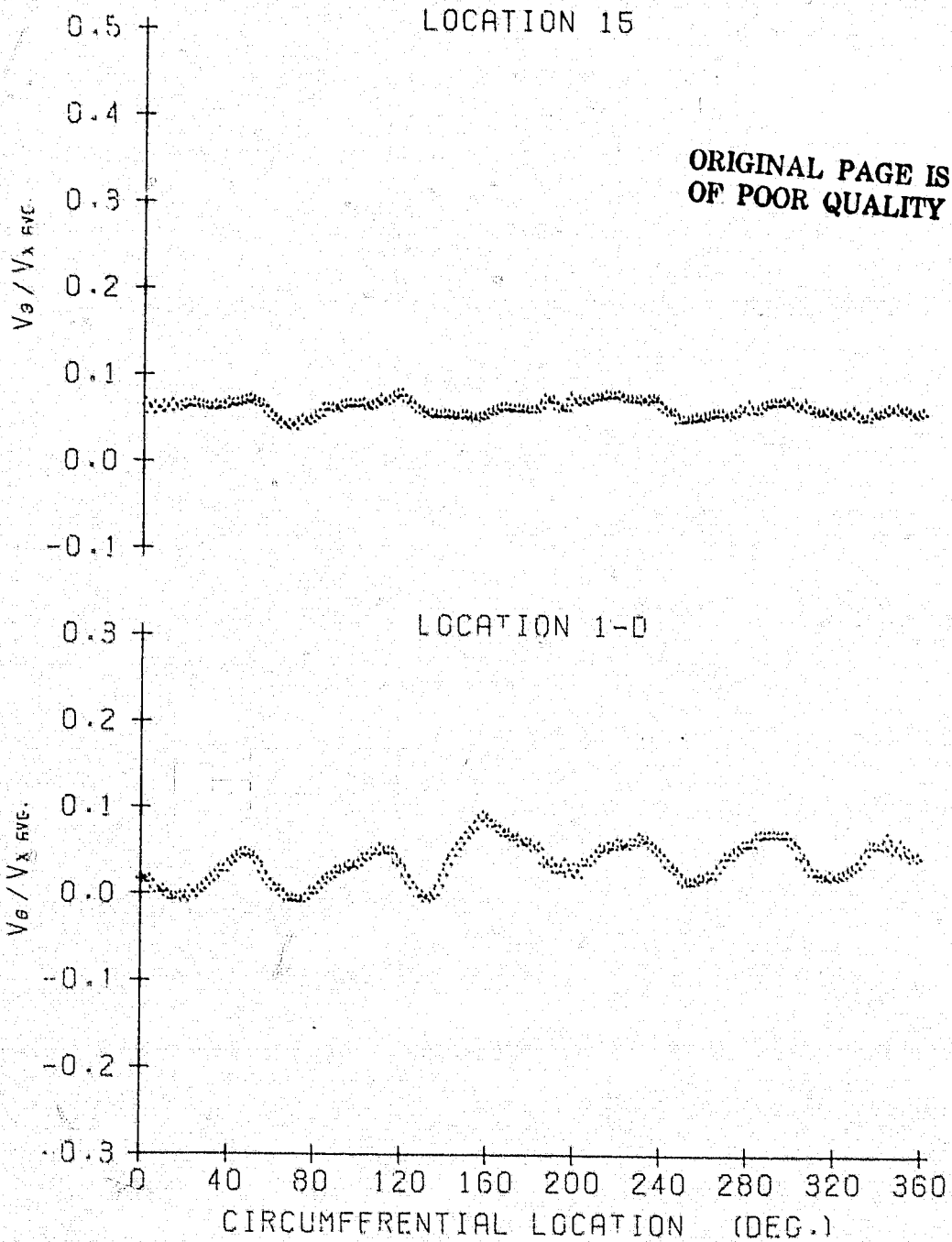


Figure E.32

10 October 1978

LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1457

AVG. FLOW COEF. = 0.679
AVG. P-RISE COEF. = 0.131
AVG. INCIDENCE = 0.19 DEG.

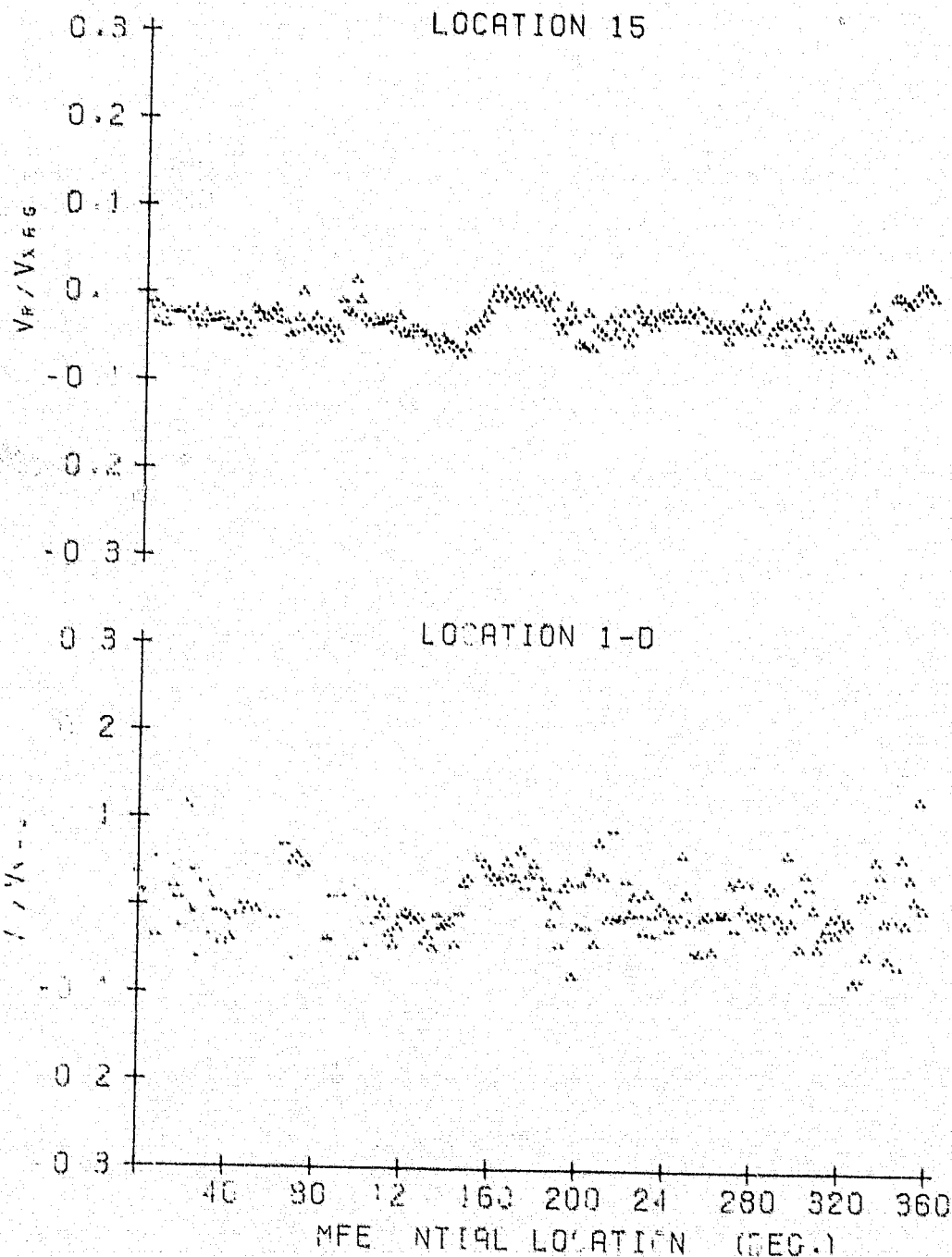


Figure E.33

10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM - 1457

AVG. FLOW COEF. = 0.679
AVG. P-RISE COEF. = 0.131
AVG. INCIDENCE = 0.19 DEG.

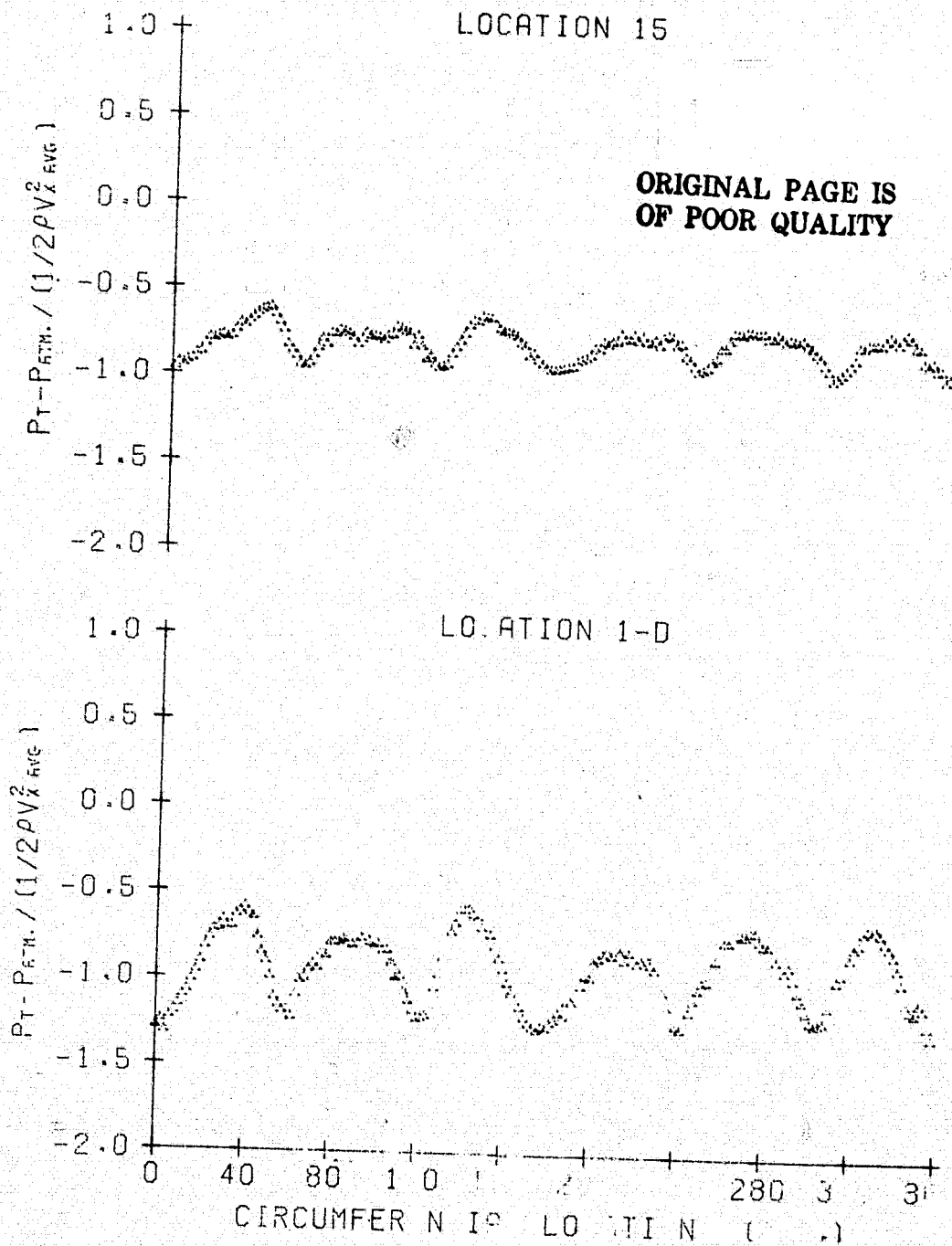


Figure E.34

10 October 1978

LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
5 CYCLE DISTORTION
RPM = 1457

AVG. FLOW COEF. = 0.679
AVG. P-RISE COEF. = 0.121
AVG. INCIDENCE = 0.19 DEG.

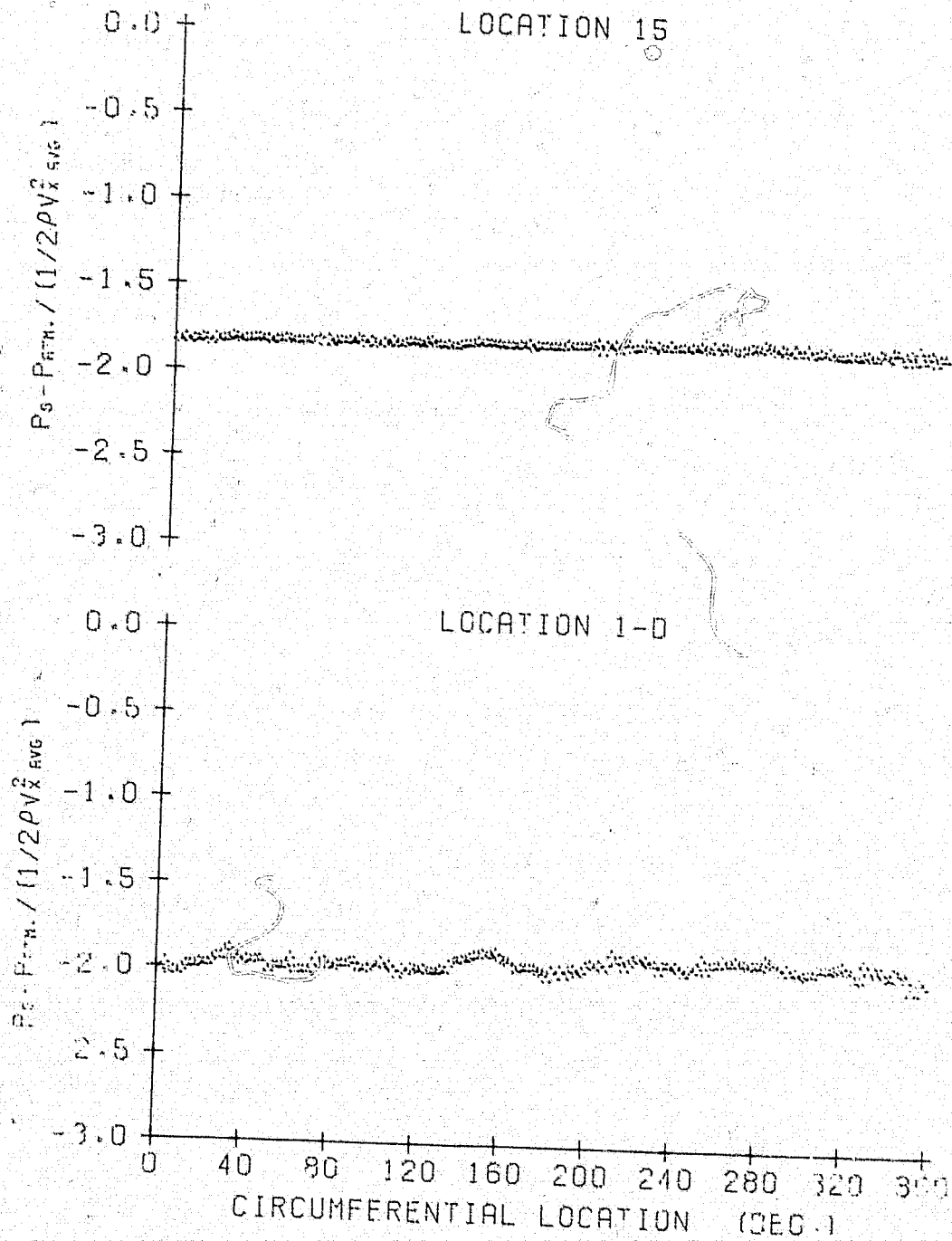


Figure E.35

10 October 1978
LCB:jep

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6 BLADES
55 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1457

AVG. FLOW COEF. = 0.679
AVG. P-RISE COEF. = 0.131
AVG. INCIDENCE = 0.19 DEG.

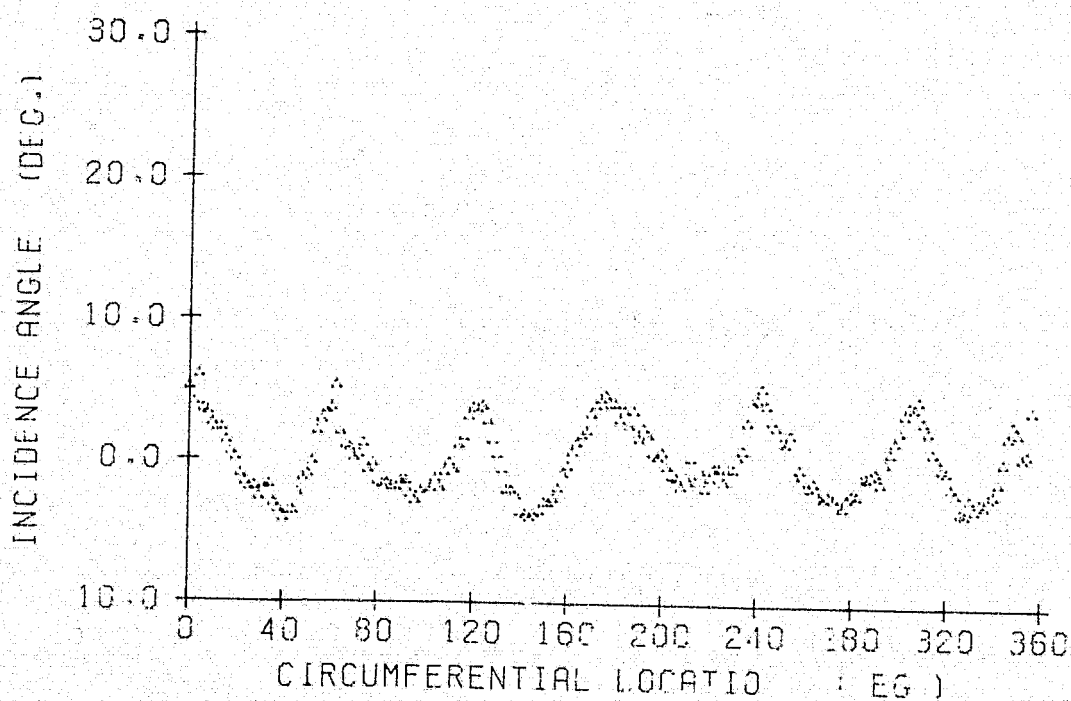


Figure E.36

10 October 1978
LCB:jep

5 BLADES
55 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1698

AVG. FLOW COEF. = 0.586
AVG. P-RISE COEF. = 0.708
AVG. INCIDENCE = 4.25 DEG.

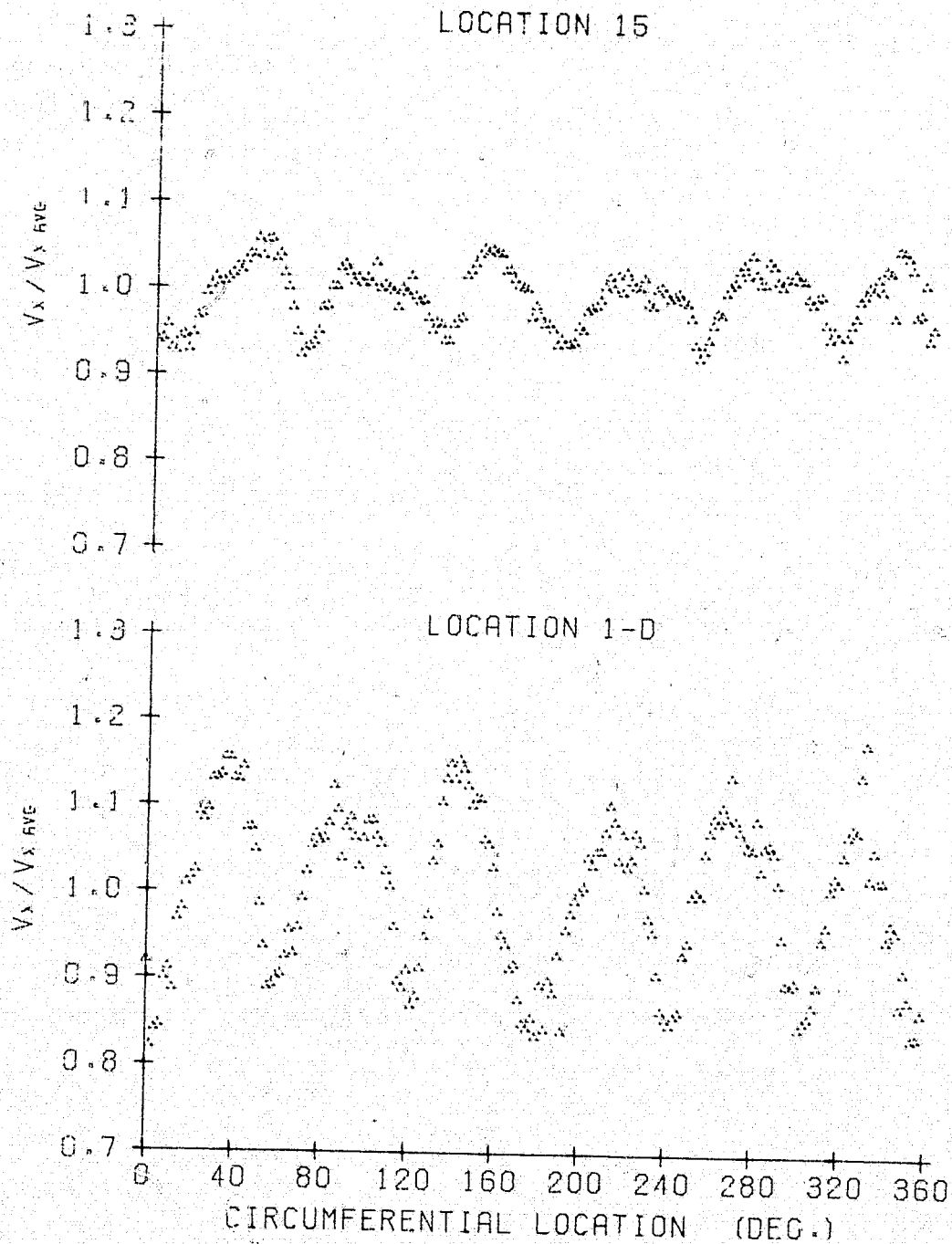


Figure E.37

10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1698

AVG. FLOW COEF. = 0.586
AVG. P-RISE COEF. = 0.708
AVG. INCIDENCE = 4.25 DEG.

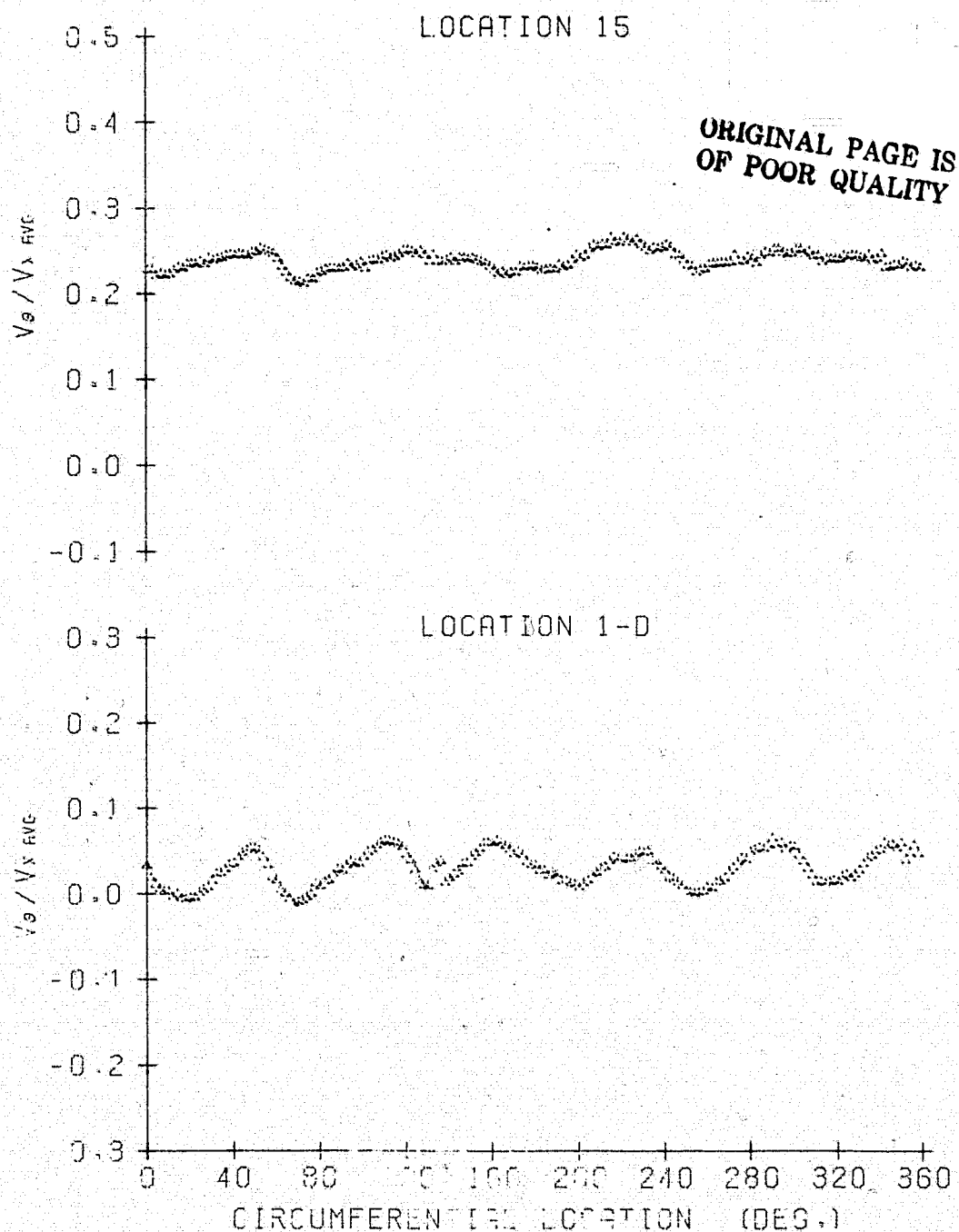


Figure E.38

10 October 1978

LCB:jep

5 BLADES
55 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1698

AVG. FLOW COEF. = 0.586
AVG. P-RISE COEF. = 0.708
AVG. INCIDENCE = 4.25 DEG.

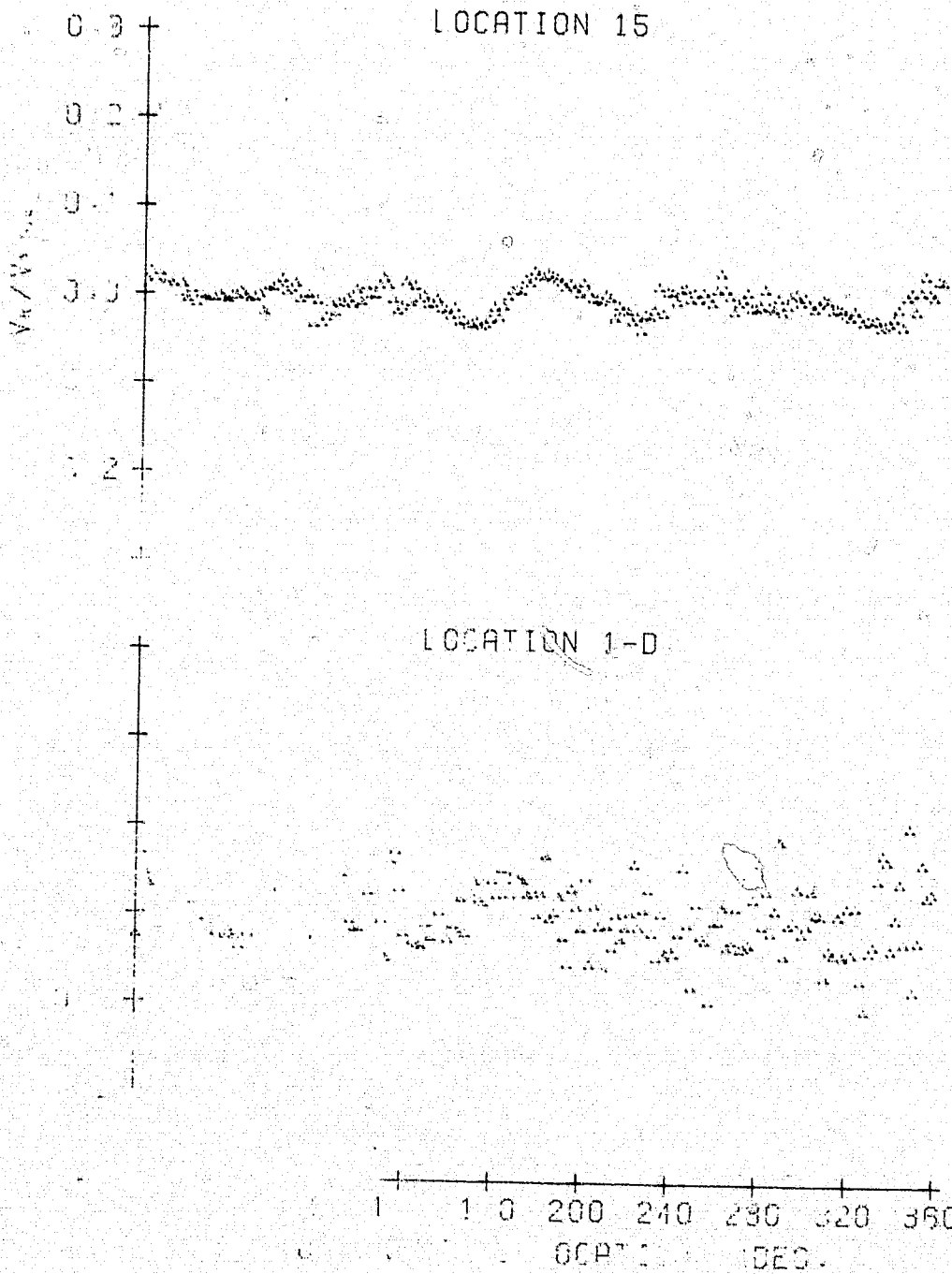


Figure E.39

6 BLADES
55 DEG. STAGGER ANGLE
5 CYCLE DISTORTION
RPM = 1698

AVG. FLOW COEF. = 0.586
AVG. P-RISE COEF. = 0.708
AVG. INCIDENCE = 4.25 DEG.

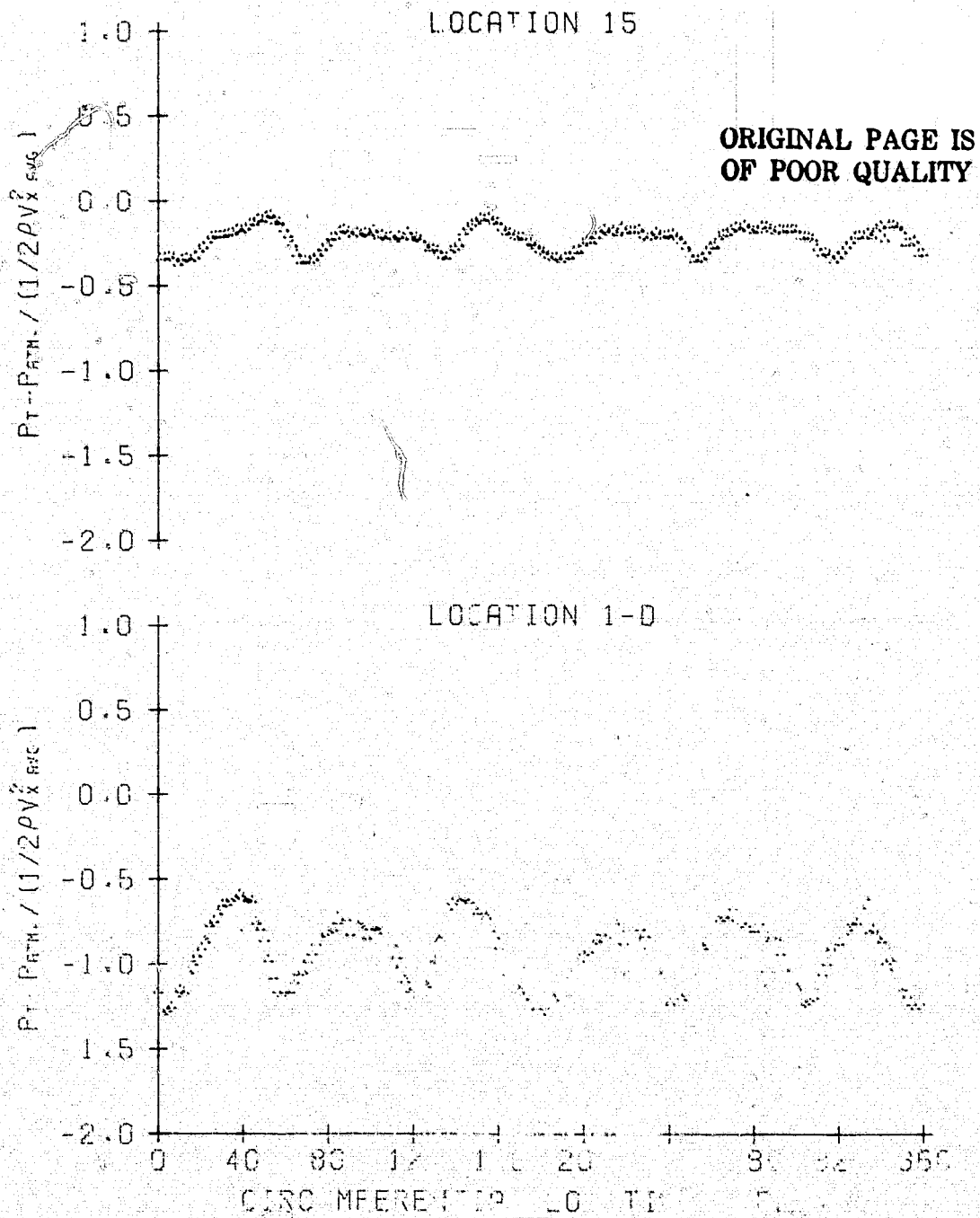


Figure E.40

10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1698

AVG. FLOW COEF. = 0.586
AVG. P-RISE COEF. = 0.708
AVG. INCIDENCE = 4.25 DEG.

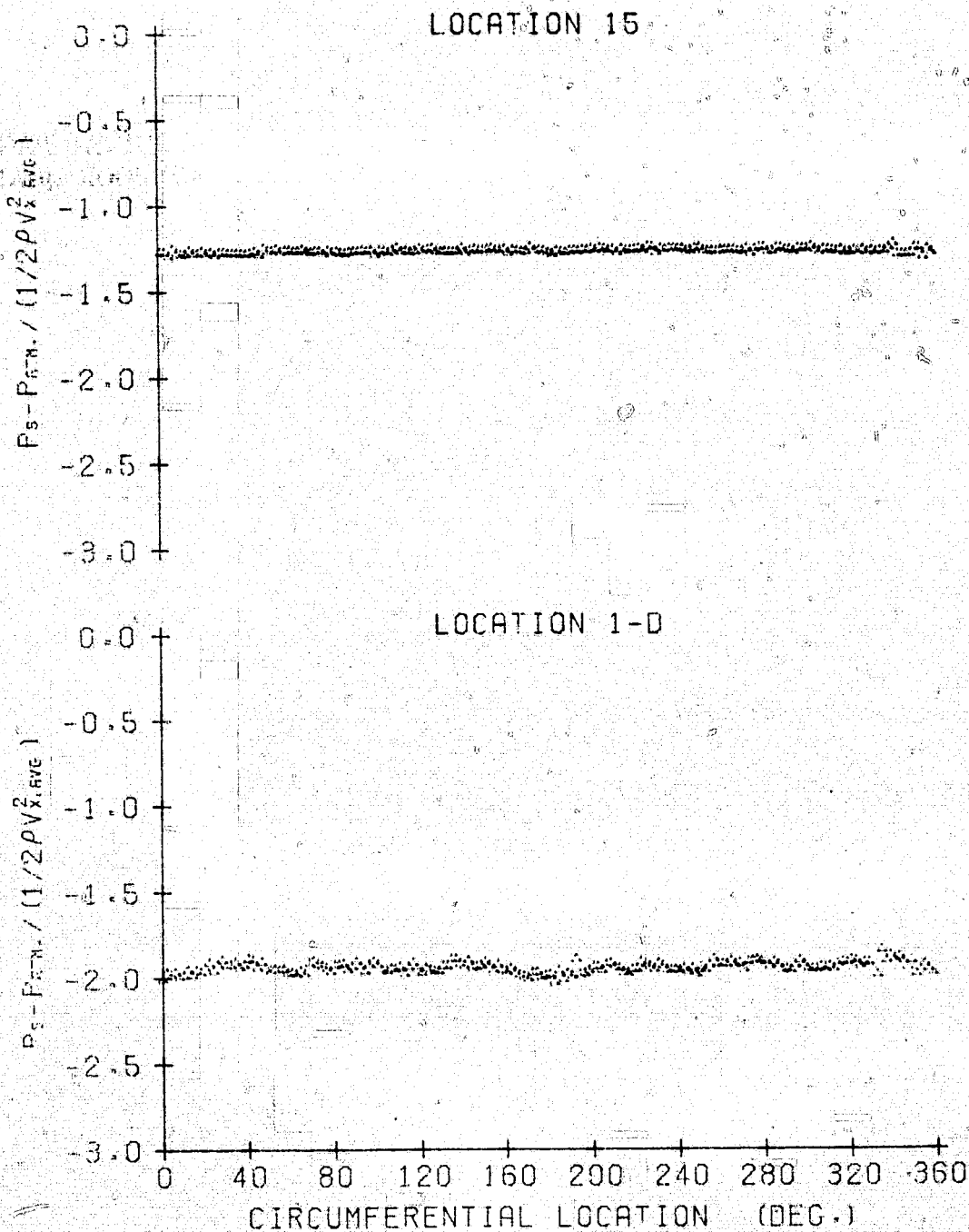


Figure E.41

10 October 1978
LCB:jep

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6 BLADES
55 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1698

AVG. FLOW COEF. = 0.586
AVG. P-RISE COEF. = 0.708
AVG. INCIDENCE = 4.25 DEG.

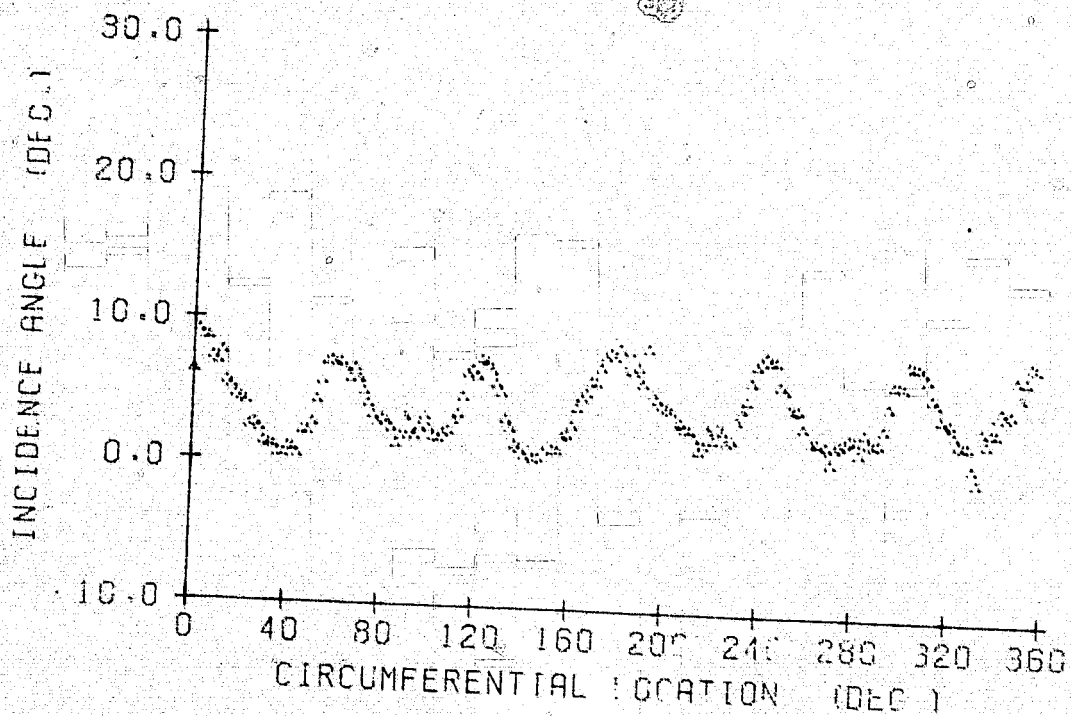


Figure E.42

10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 2002

AVG. FLOW COEF. = 0.487
AVG. P-RISE COEF. = 1.767
AVG. INCIDENCE = 8.52 DEG.

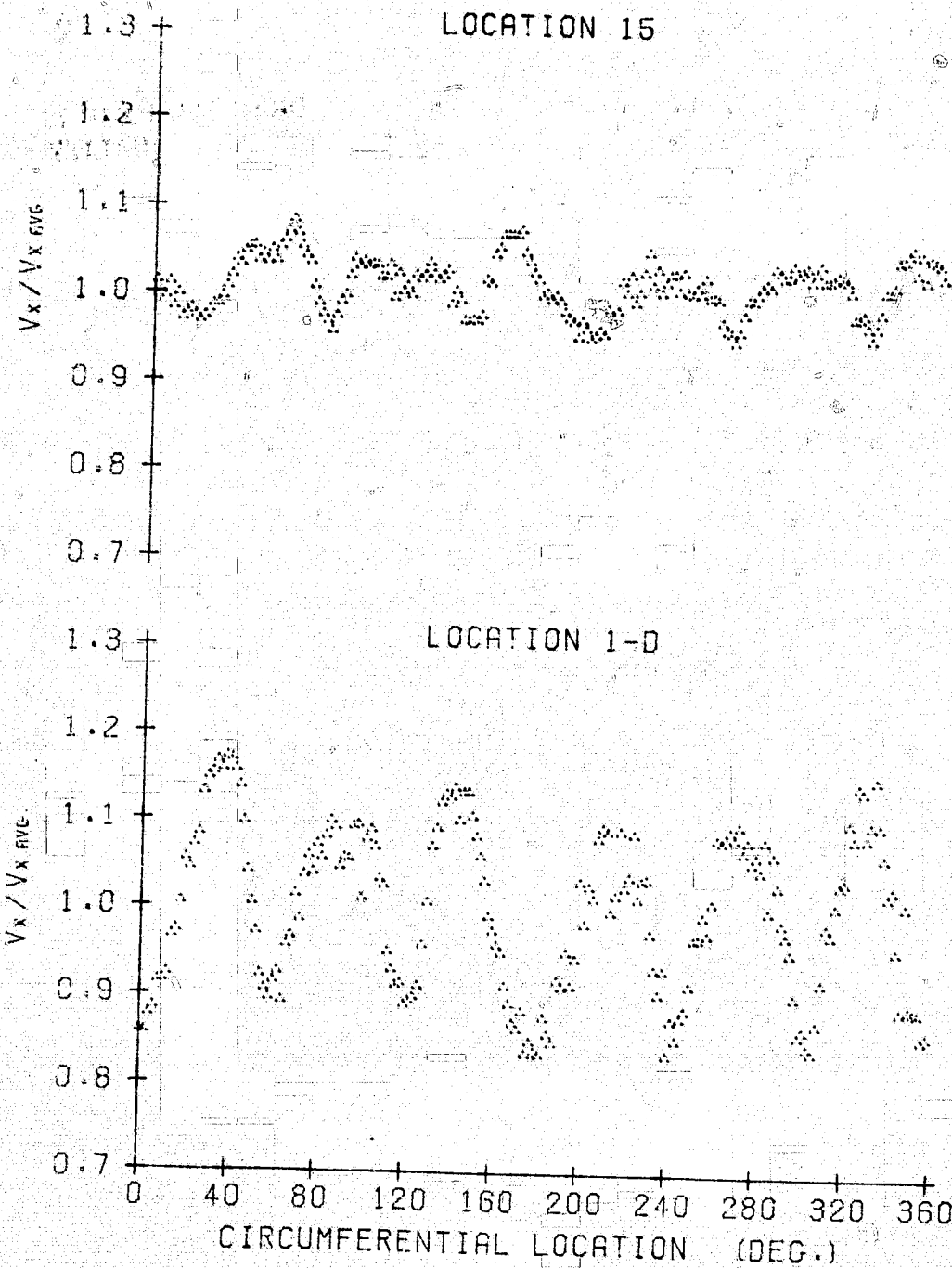


Figure E.43

10 October 1978

LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 2002

AVG. FLOW COEF. = 0.487
AVG. P-RISE COEF. = 1.767
AVG. INCIDENCE = 8.52 DEG.

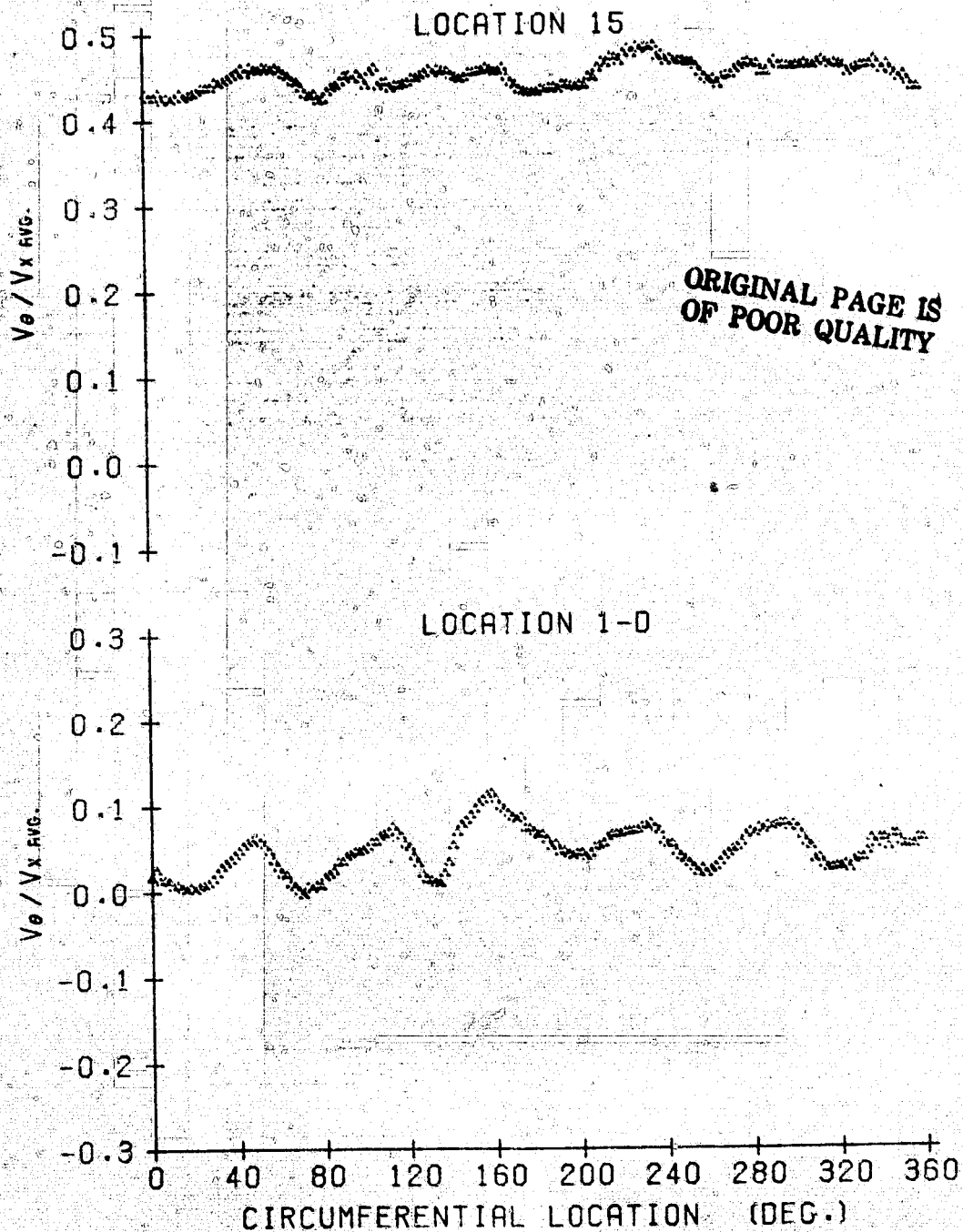


Figure E.44

C-4

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10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 2002

AVG. FLOW COEF. = 0.487
AVG. P-RISE COEF. = 1.767
AVG. INCIDENCE = 8.52 DEG.

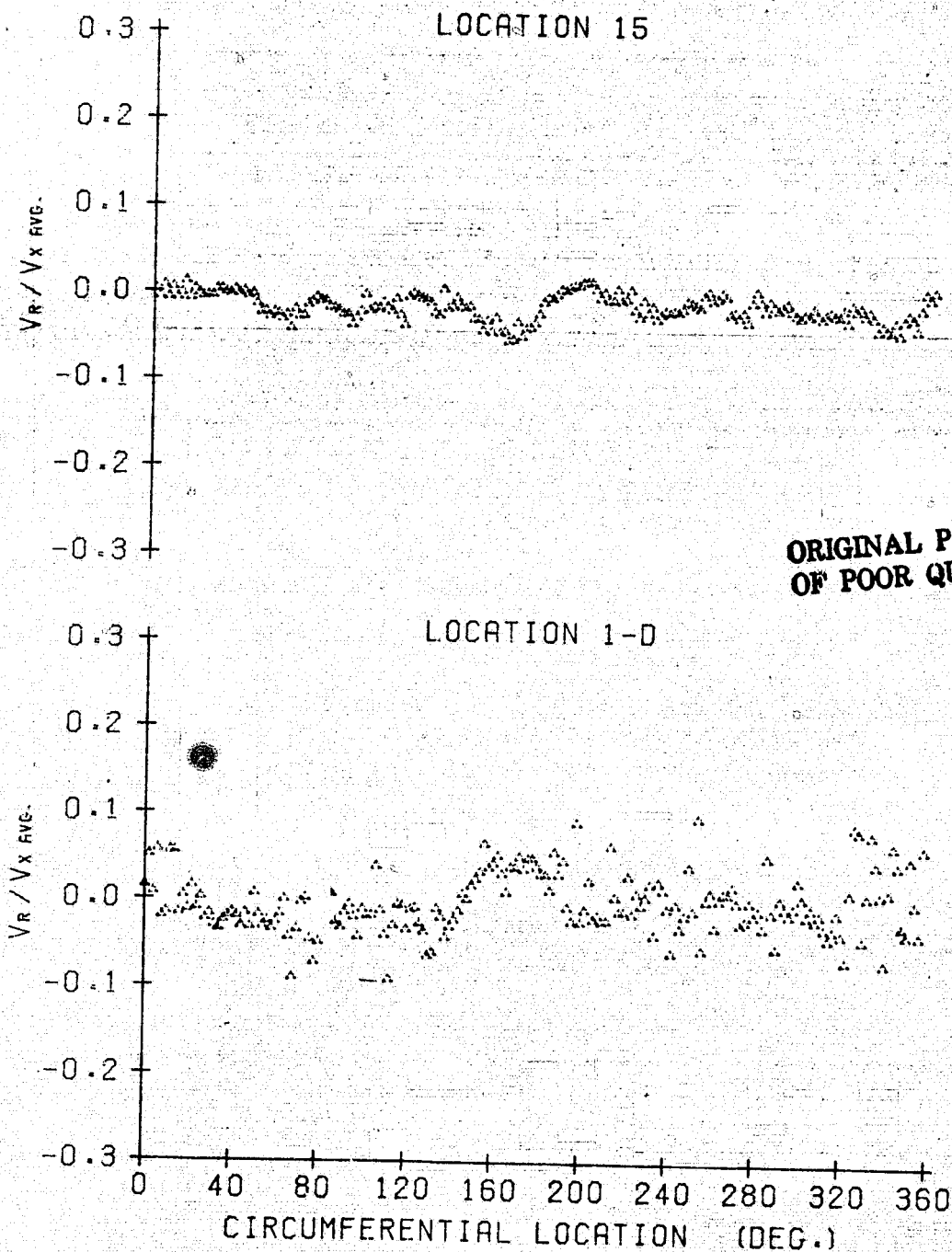


Figure E.45

10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 2002

AVG. FLOW COEF. = 0.487
AVG. P-RISE COEF. = 1.767
AVG. INCIDENCE = 8.52 DEG.

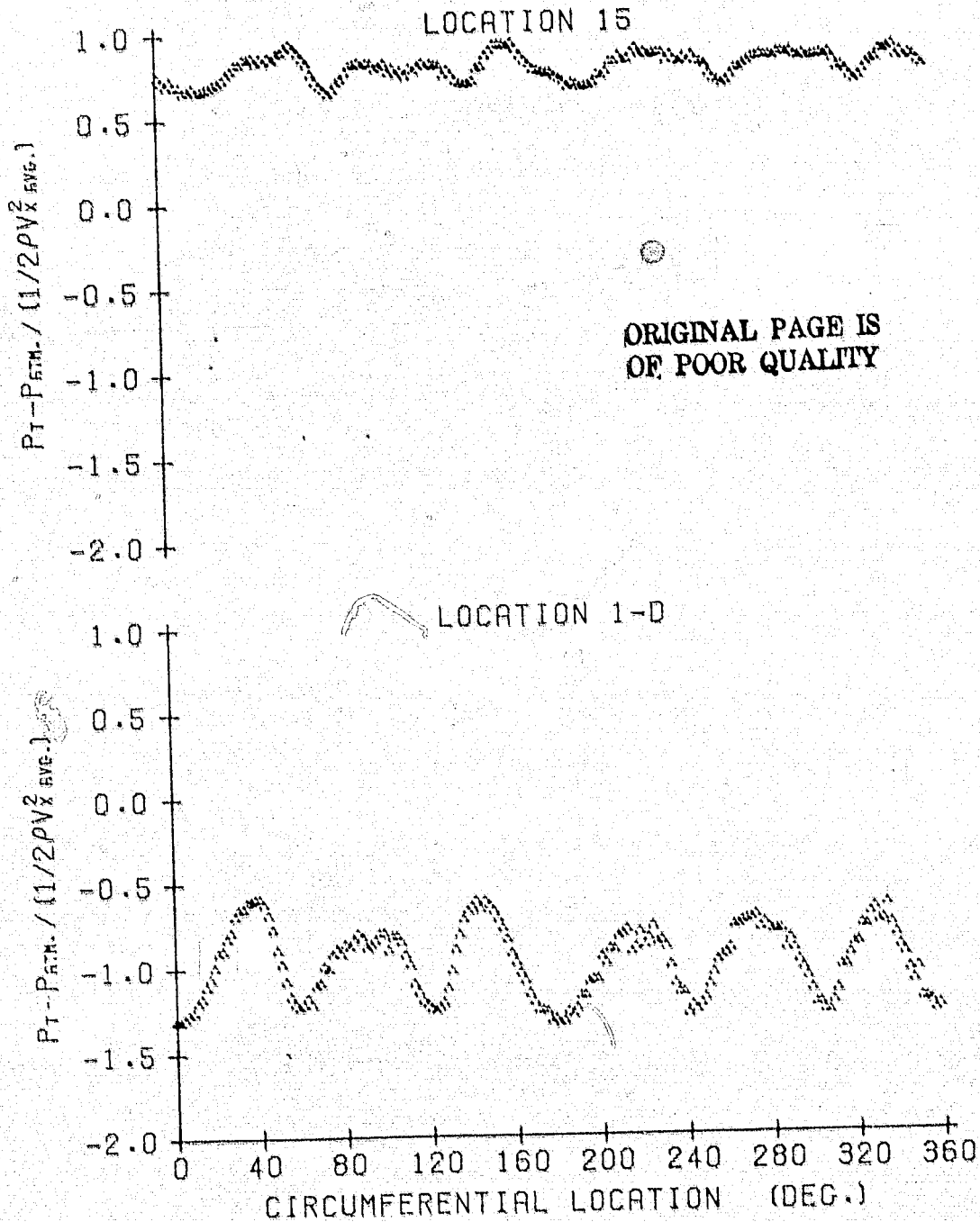


Figure E.46

10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 2002

AVG. FLOW COEF. = 0.487
AVG. P-RISE COEF. = 1.767
AVG. INCIDENCE = 8.52 DEG.

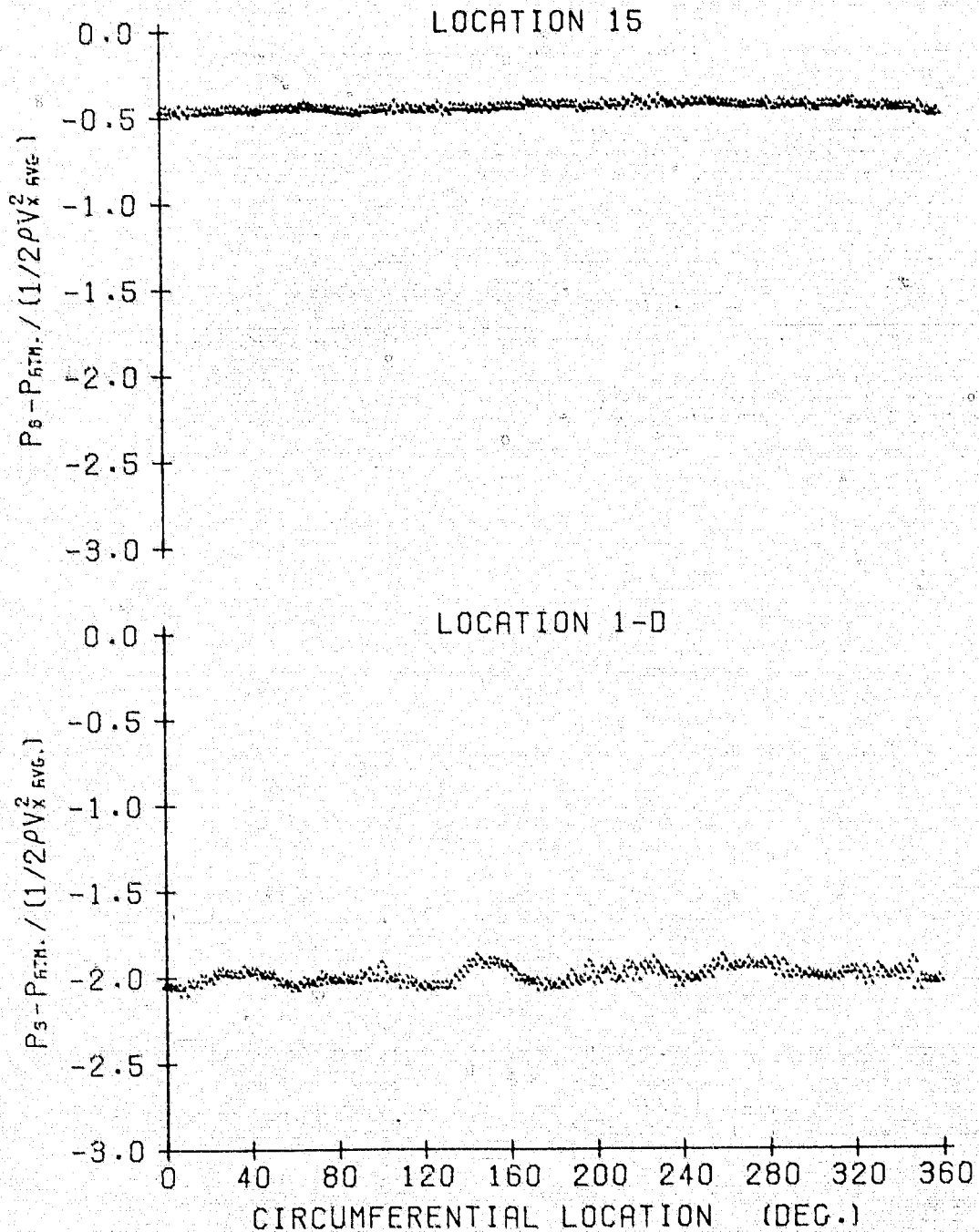


Figure E.47

10 October 1978
LCB:jep

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6 BLADES
55 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 2002

AVG. FLOW COEF. = 0.487
AVG. P-RISE COEF. = 1.767
AVG. INCIDENCE = 8.52 DEG.

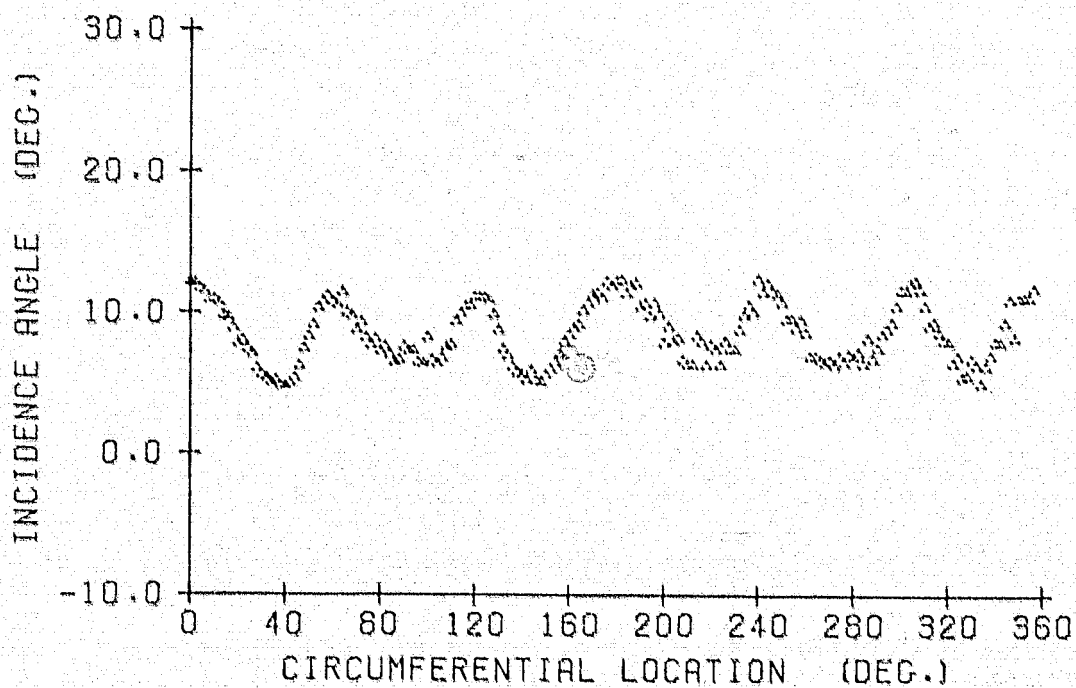


Figure E.48

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1562

AVG. FLOW COEF. = 0.626
AVG. P-RISE COEF. = 1.244
AVG. INCIDENCE = 1.65 DEG.

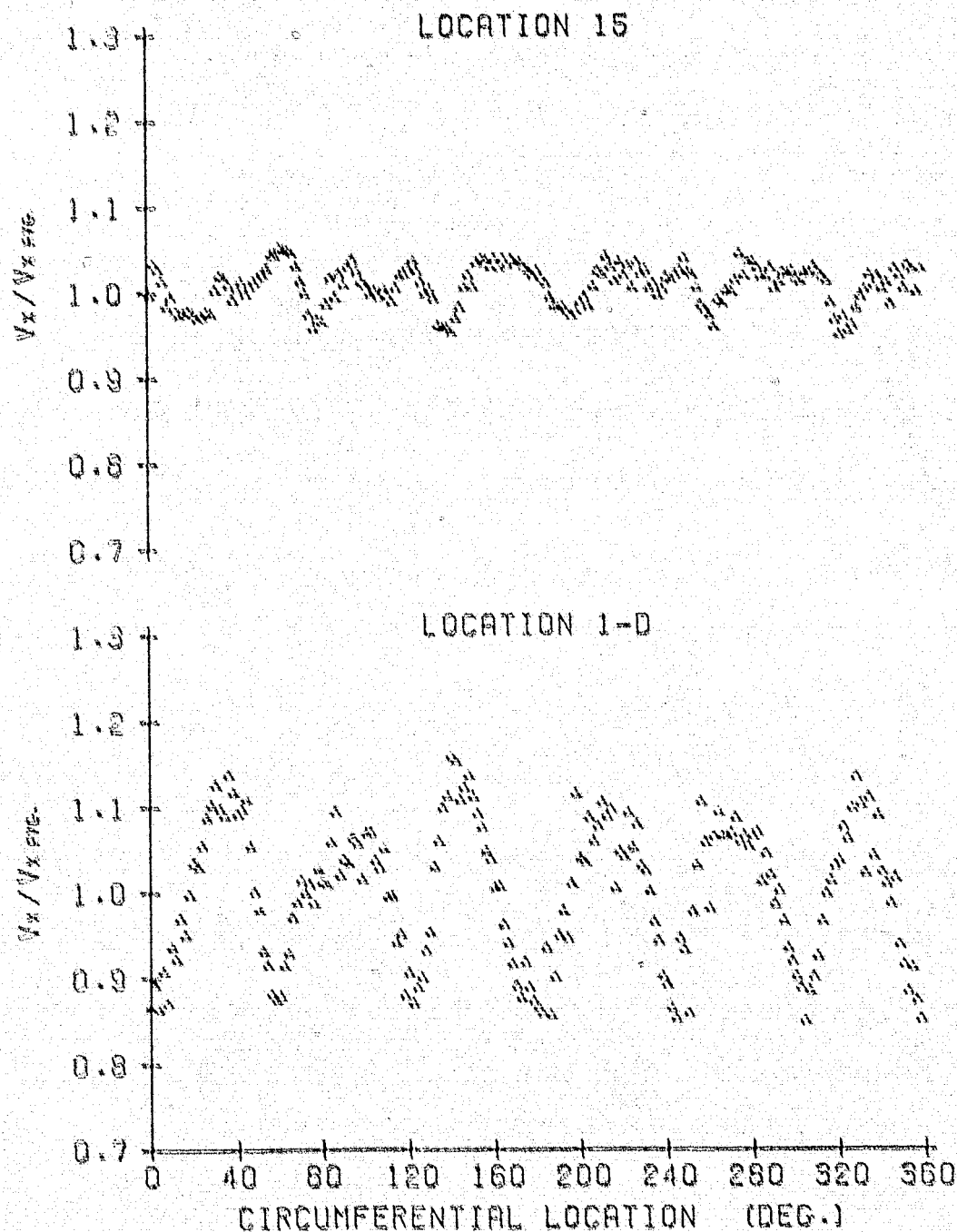


Figure E.49

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1562

AVG. FLOW COEF. = 0.626
AVG. P-RISE COEF. = 1.244
AVG. INCIDENCE = 1.65 DEG.

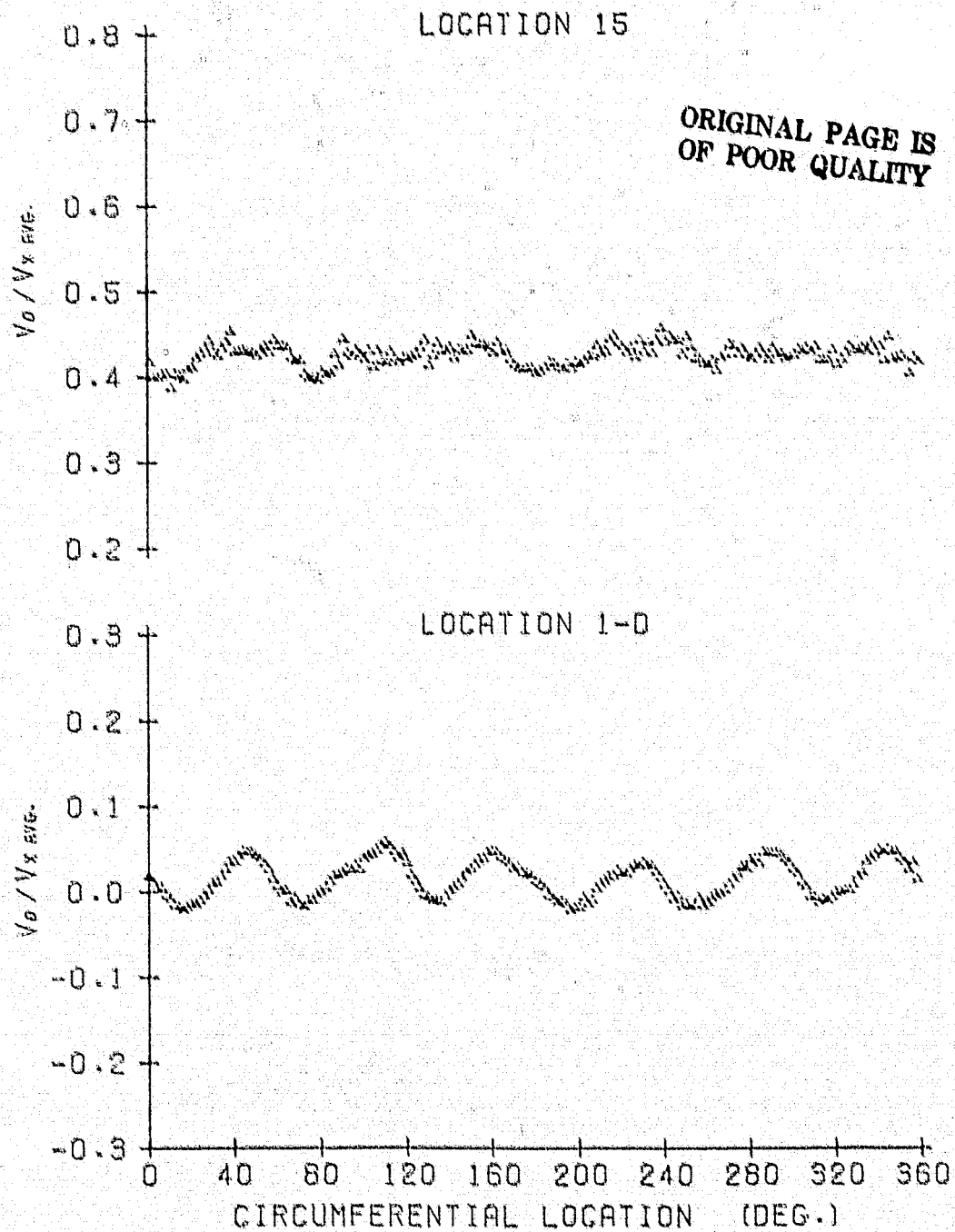


Figure E.50

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1562

AVG. FLOW COEF. = 0.626
AVG. P-RISE COEF. = 1.244
AVG. INCIDENCE = 1.65 DEG.

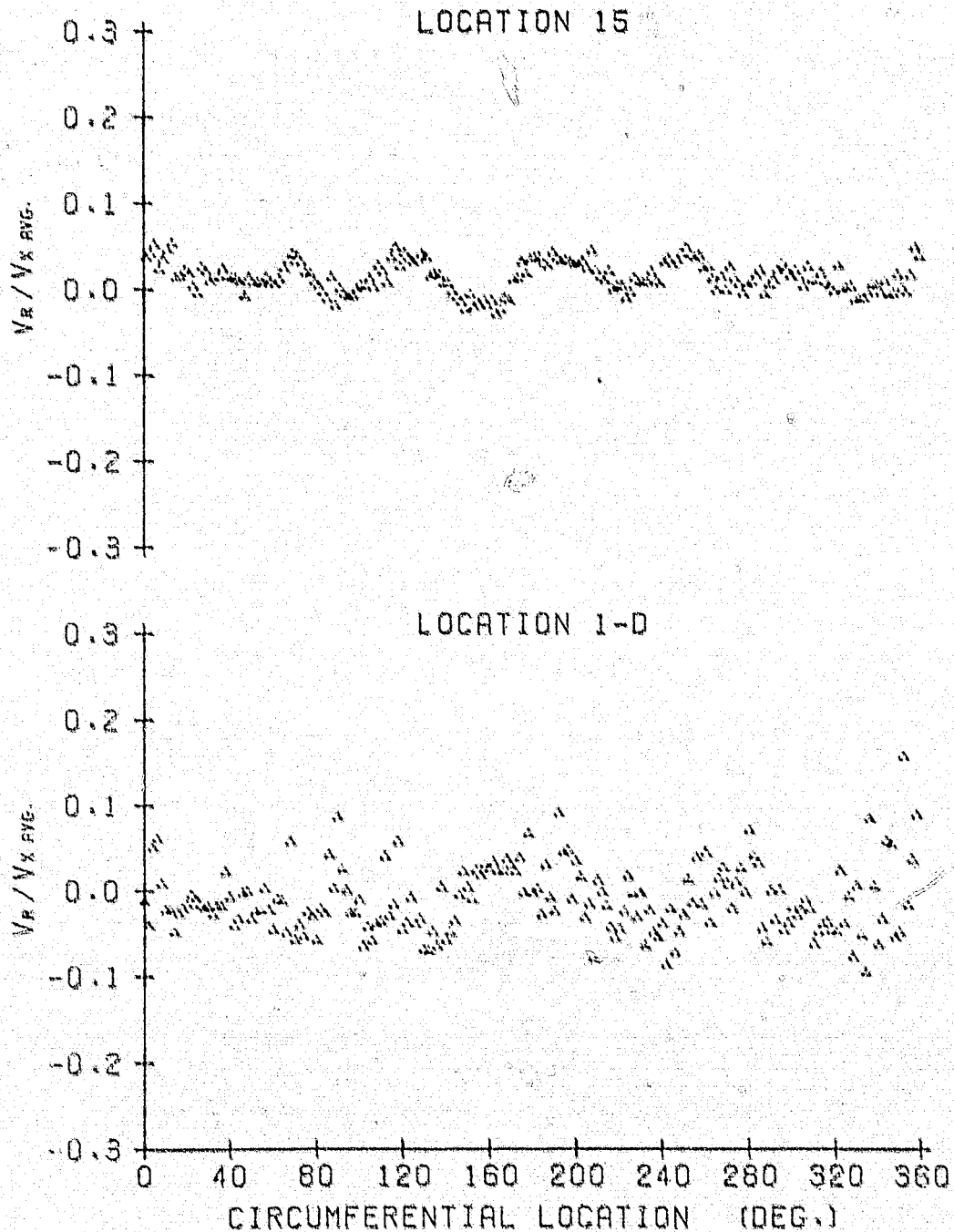


Figure E.51

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1562

AVG. FLOW COEF. = 0.626
AVG. P-RISE COEF. = 1.244
AVG. INCIDENCE = 1.65 DEG.

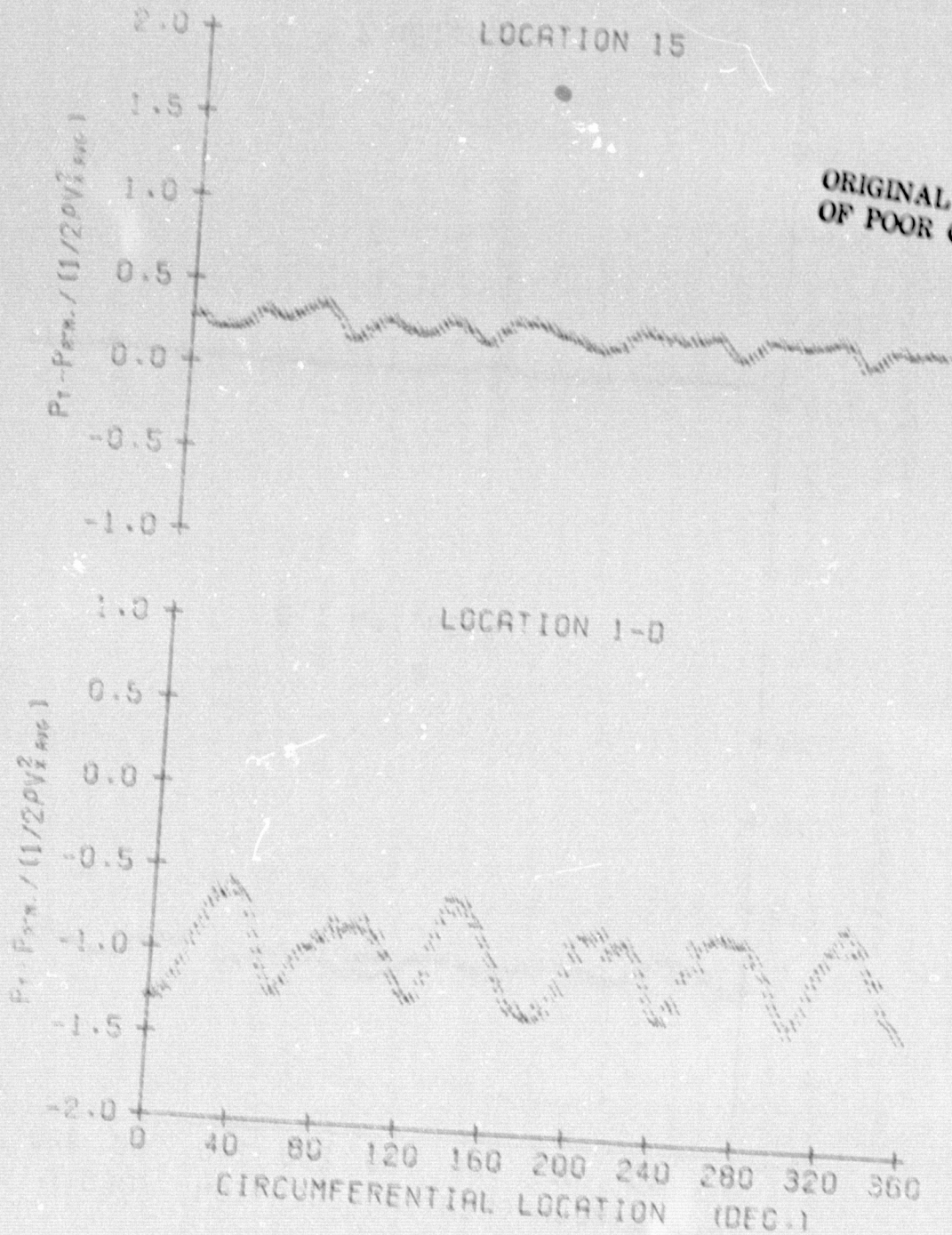


Figure E.52

10 October 1978

LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM : 1562

AVG. FLOW COEF. = 0.626
AVG. P-RISE COEF. = 1.244
AVG. INCIDENCE = 1.65 DEG.

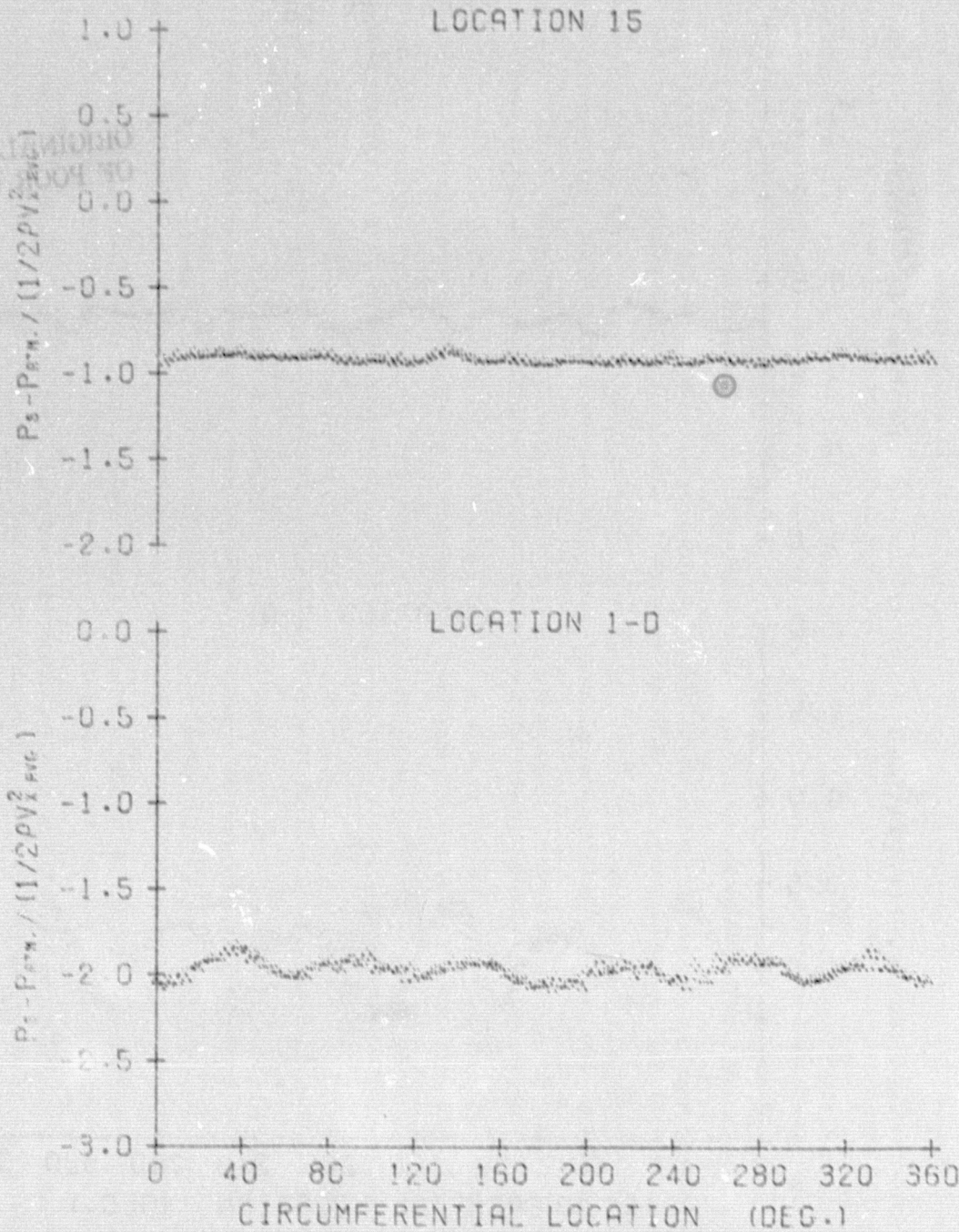


Figure E.53

10 October 1978
LCB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1562

AVG. FLOW COEF. = 0.626
AVG. P-RISE COEF. = 1.244
AVG. INCIDENCE = 1.65 DEG.

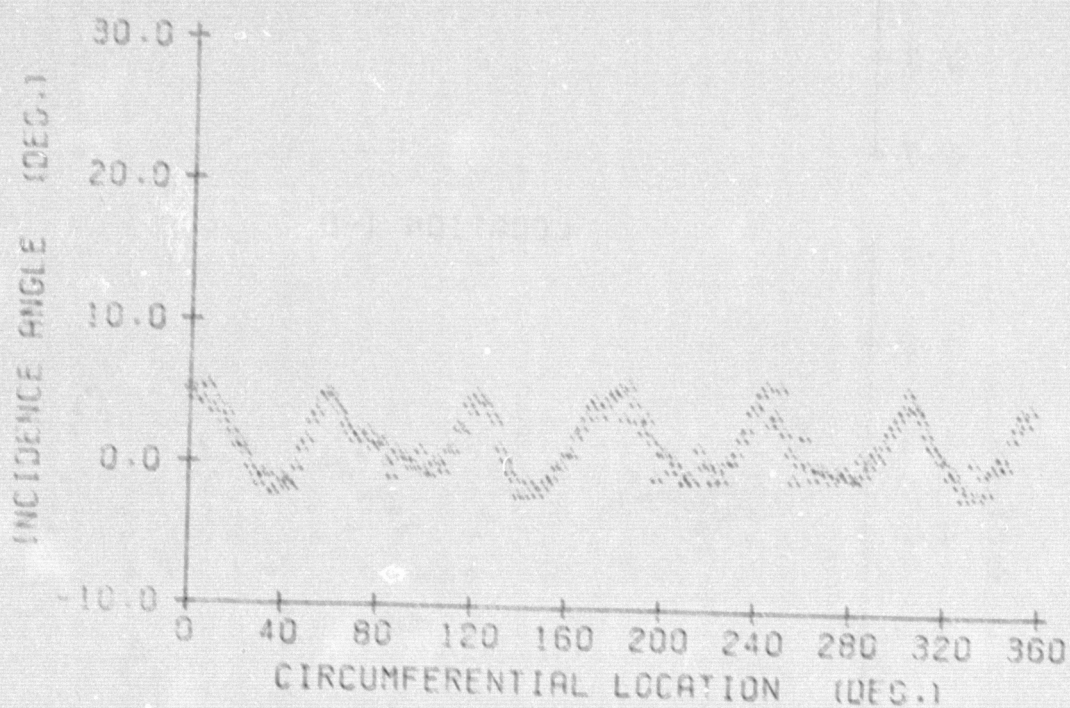


Figure E.54

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1741

AVG. FLOW COEF. = 0.527
AVG. P-RISE COEF. = 2.316
AVG. INCIDENCE = 5.97 DEG.

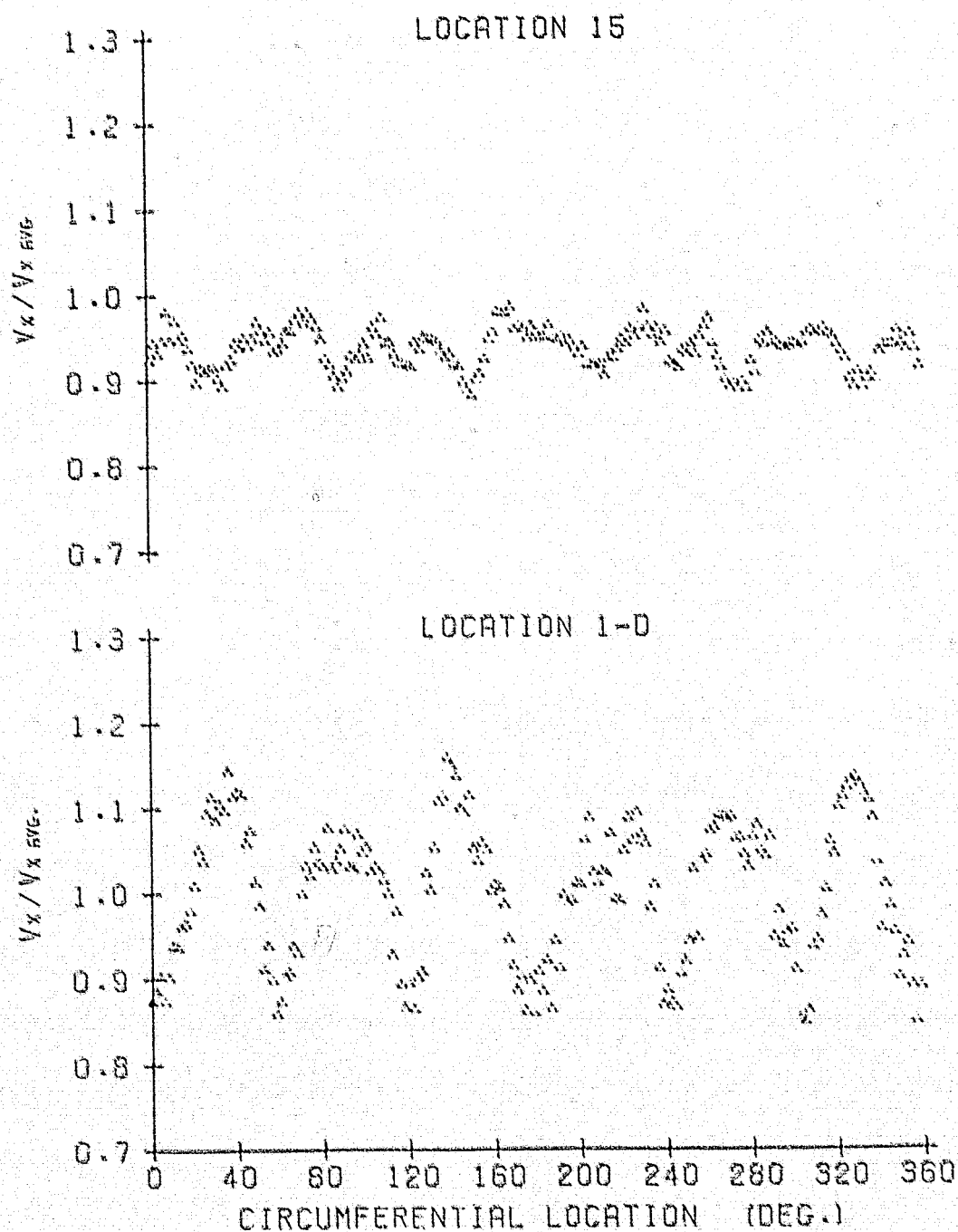


Figure E.55

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
5 CYCLE DISTORTION
RPM = 1741

AVG. FLOW COEF. = 0.527
AVG. P-RISE COEF. = 2.316
AVG. INCIDENCE = 5.97 DEG.

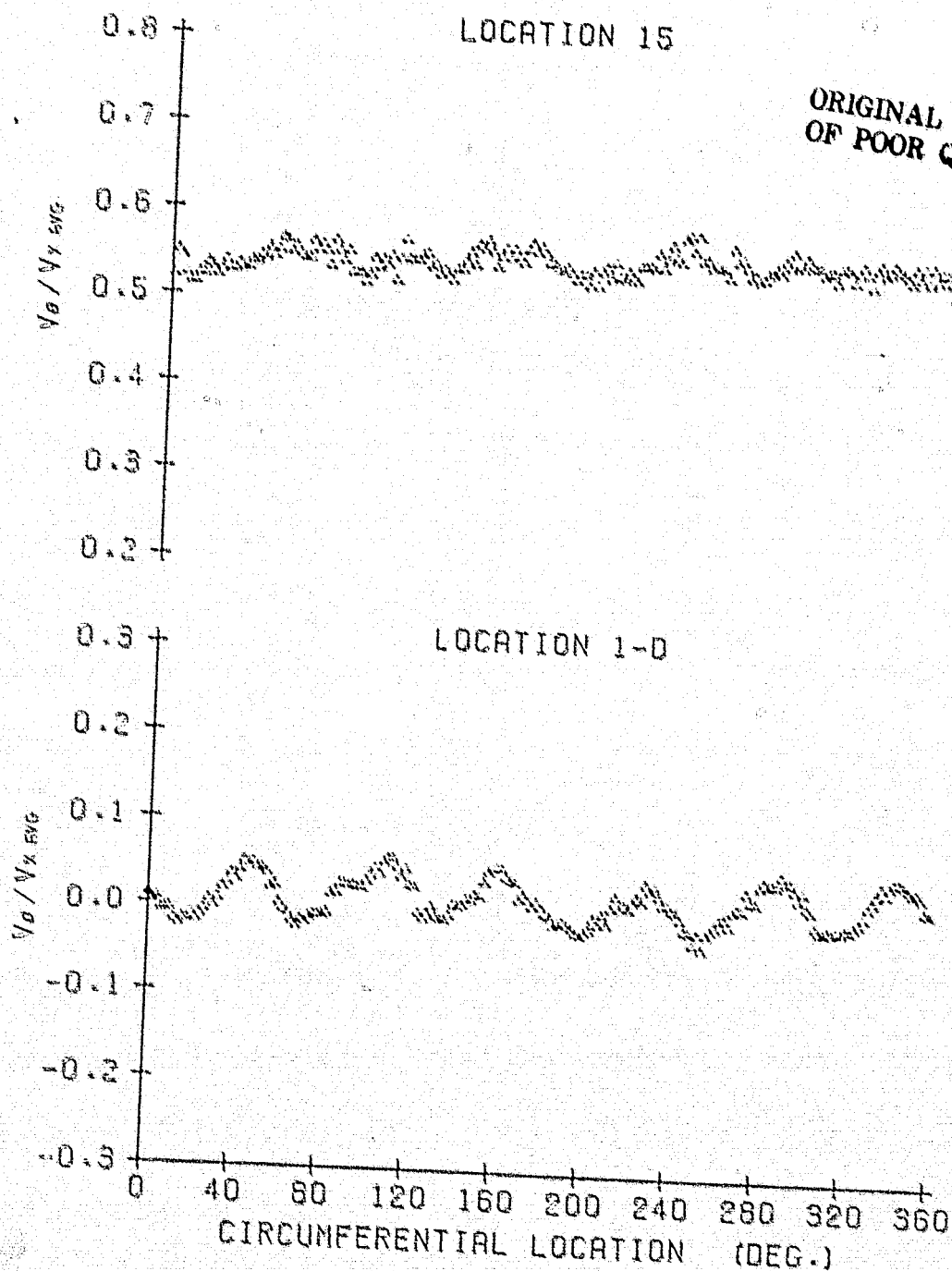


Figure E.56

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1741

AVG. FLOW COEF. = 0.527
AVG. P-RISE COEF. = 2.316
AVG. INCIDENCE = 5.97 DEG.

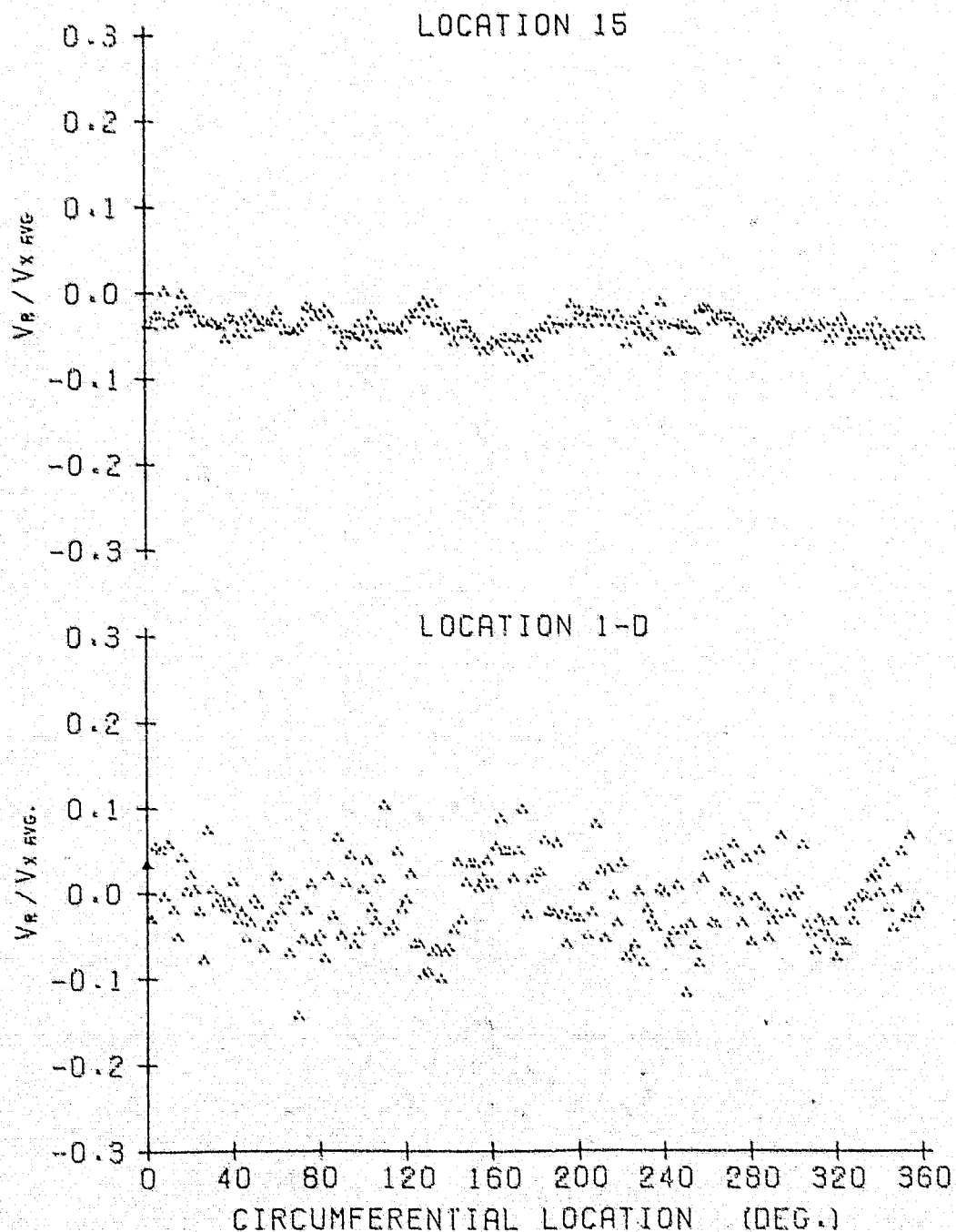


Figure E.57

10 October 1978

LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1741

AVG. FLOW COEF. = 0.527
AVG. P-RISE COEF. = 2.316
AVG. INCIDENCE = 5.97 DEG.

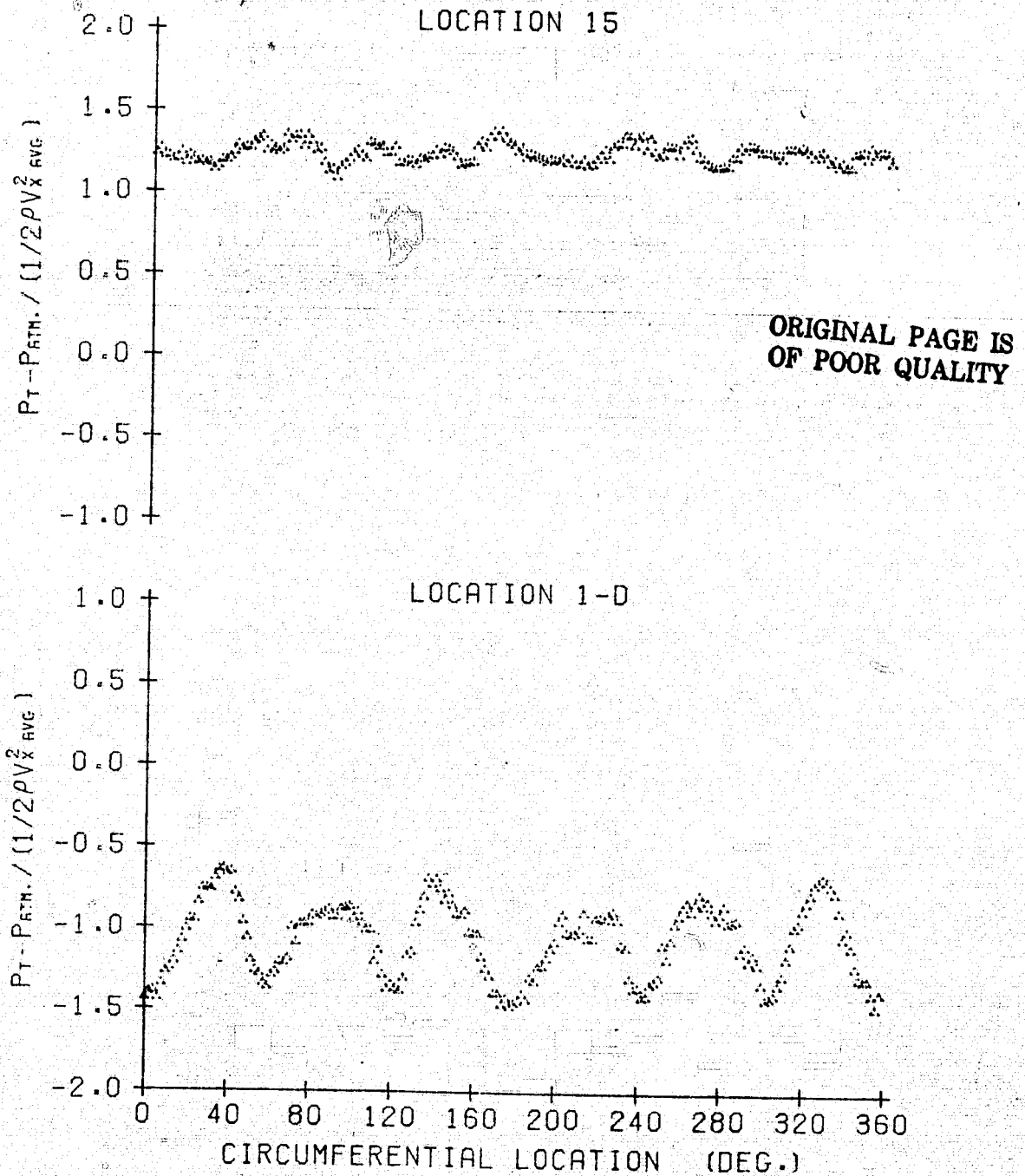


Figure E.58

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1741

AVG. FLOW COEF. = 0.527
AVG. P-RISE COEF. = 2.316
AVG. INCIDENCE = 5.97 DEG.

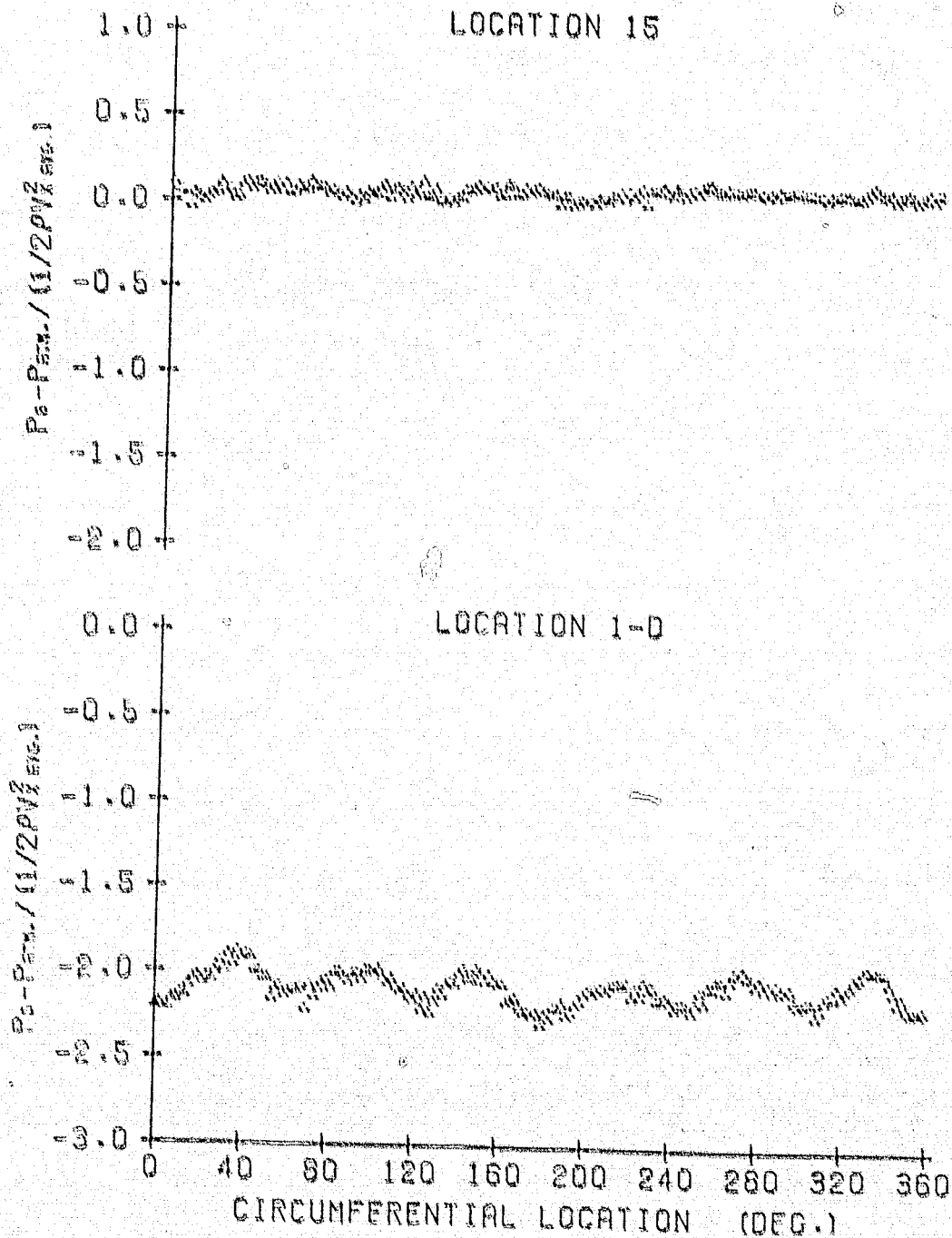


Figure E.59

10 October 1978
LGB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1741

AVG. FLOW COEF. = 0.527
AVG. P-RISE COEF. = 2.316
AVG. INCIDENCE = 5.97 DEG.

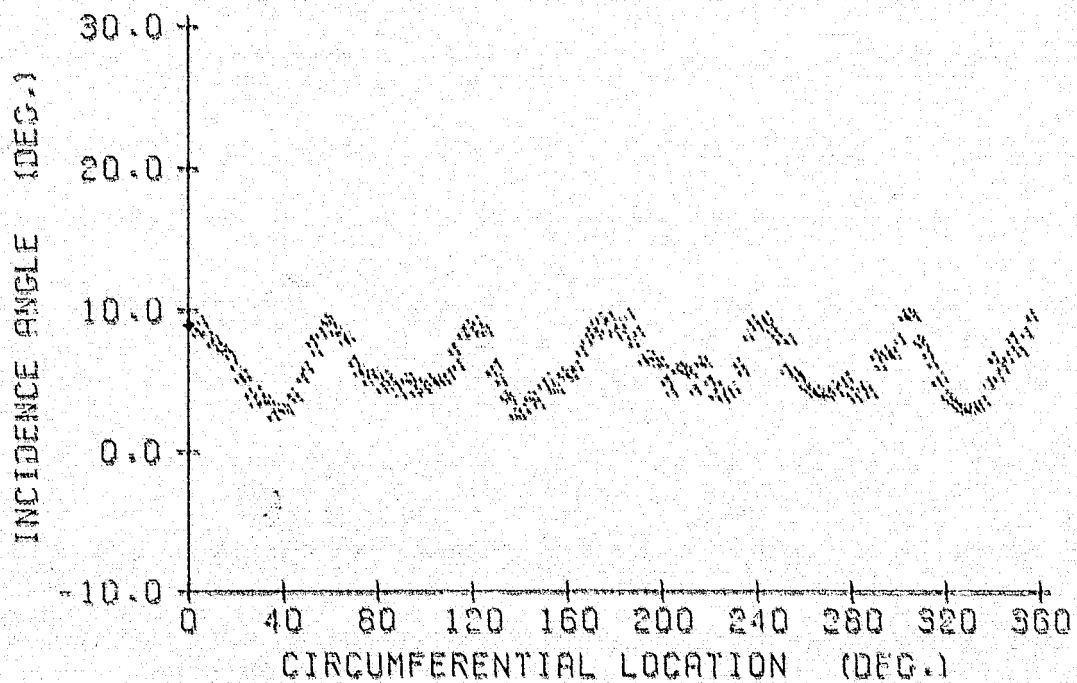


Figure E.60

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1882

AVG. FLOW COEF. = 0.530
AVG. P-RISE COEF. = 2.515
AVG. INCIDENCE = 5.81 DEG.

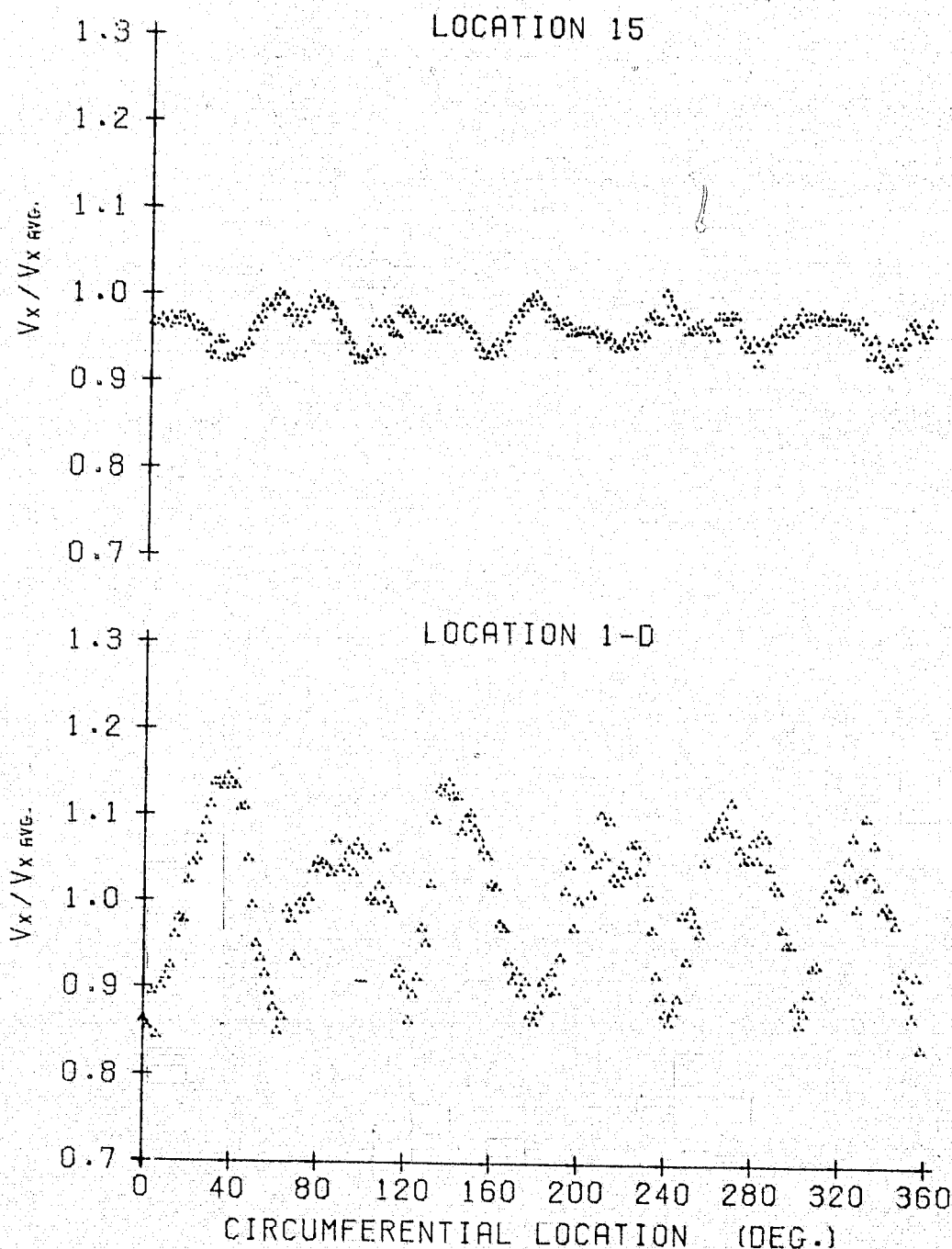


Figure E.61

10 October 1978
LGB:jep

9 BLADES
50 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1882

AVG. FLOW COEF. = 0.530
AVG. P-RISE COEF. = 2.515
AVG. INCIDENCE = 5.81 DEG.

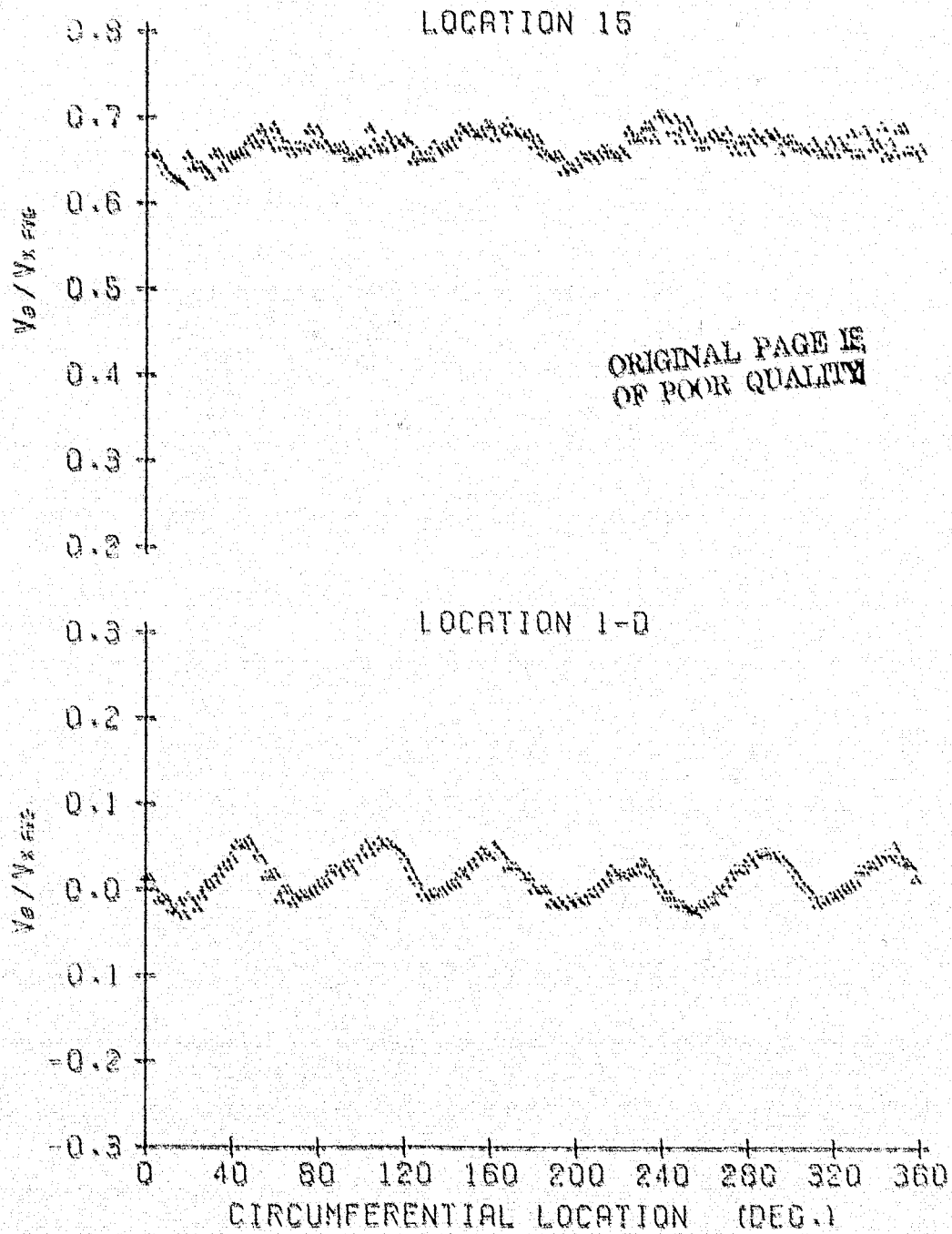


Figure E.62

10 October 1978

LCB:jep

3 BLADES
50 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1882

AVG. FLOW COEF. = 0.530
AVG. P-RISE COEF. = 2.515
AVG. INCIDENCE = 5.81 DEG.

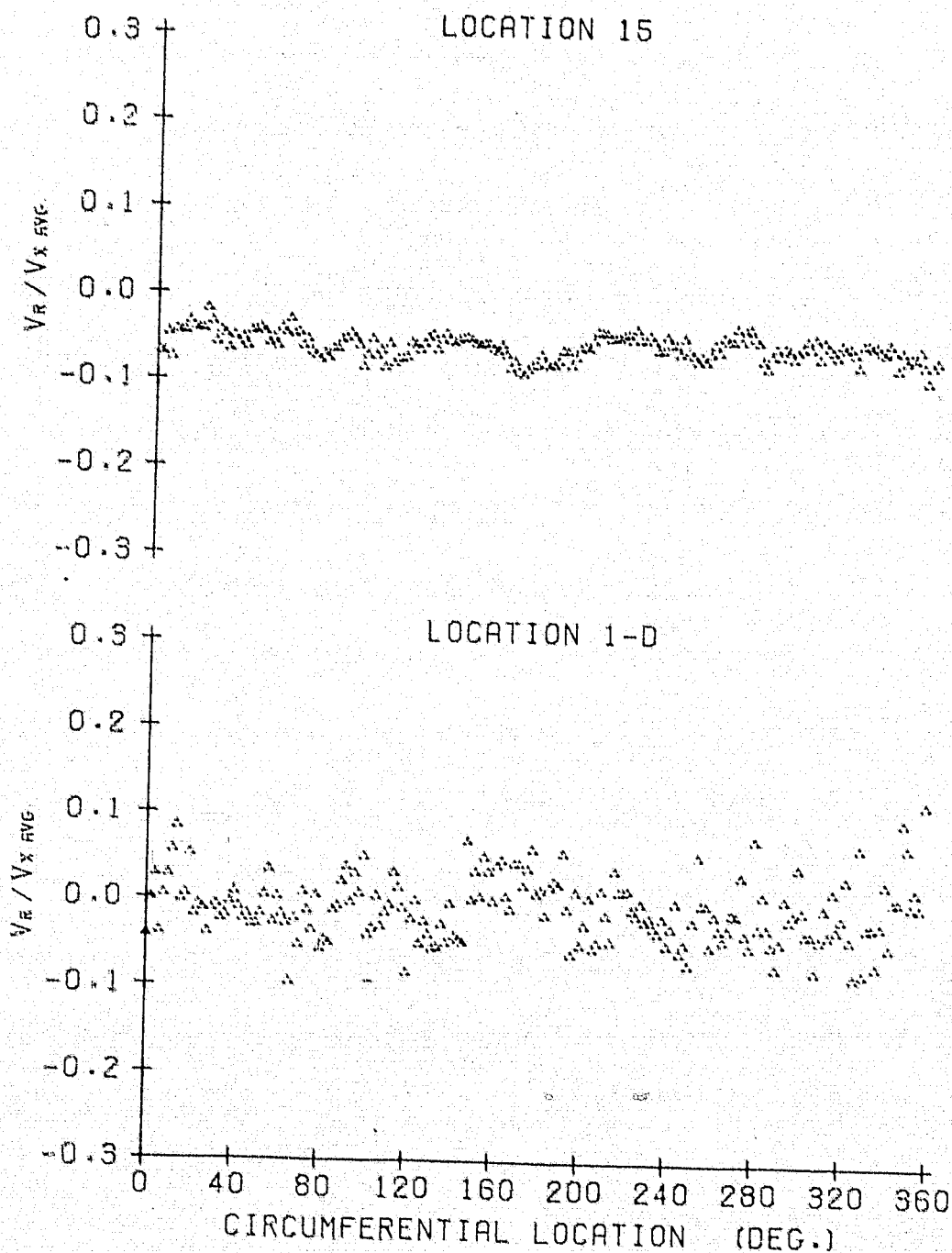


Figure E.63

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1882

AVG. FLOW COEF. = 0.530
AVG. P-RISE COEF. = 2.515
AVG. INCIDENCE = 5.81 DEG.

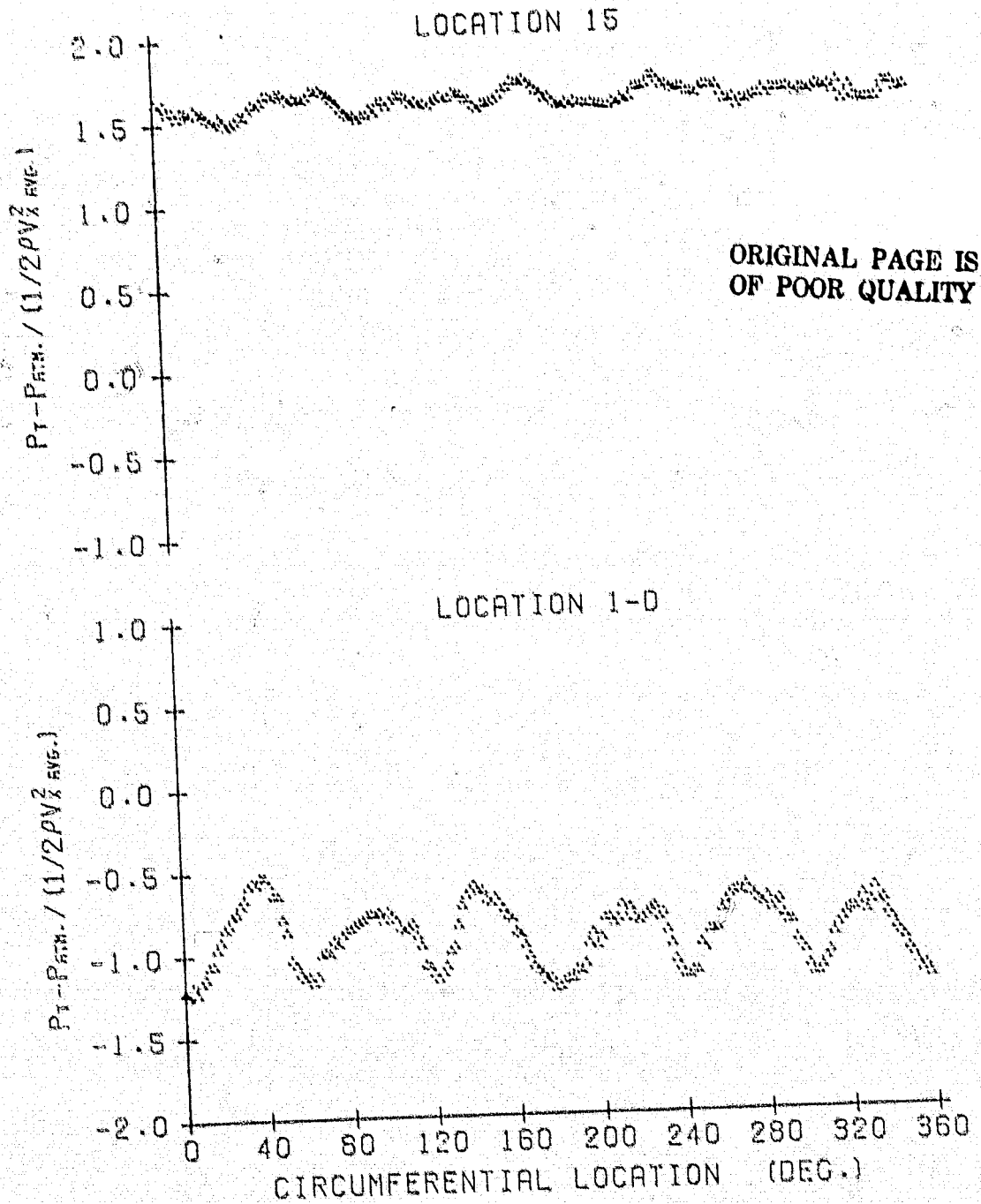


Figure E.64

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1882

AVG. FLOW COEF. = 0.530
AVG. P-RISE COEF. = 2.515
AVG. INCIDENCE = 5.81 DEG.

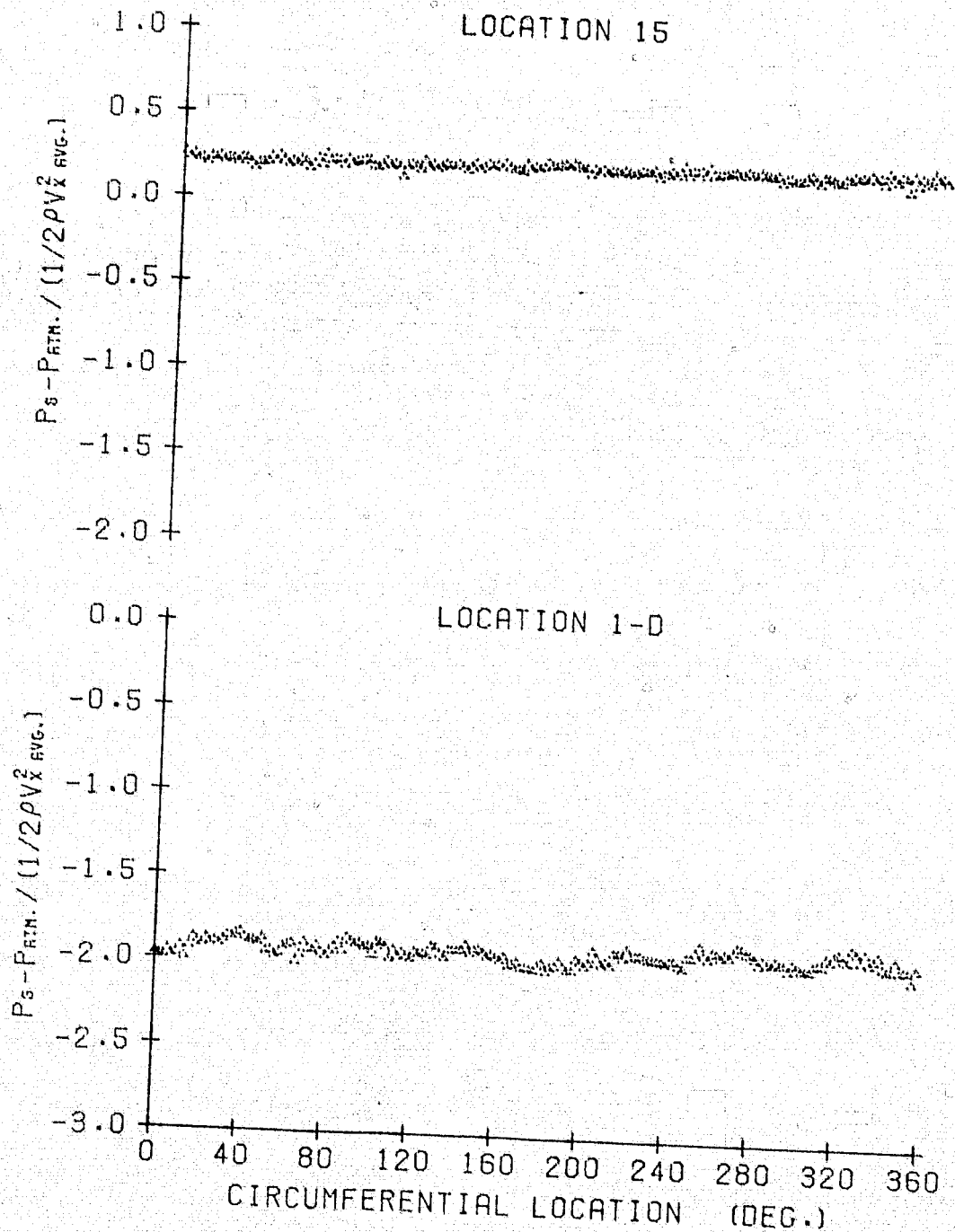


Figure E.65

10 October 1978
LCB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1882

AVG. FLOW COEF. = 0.530
AVG. P-RISE COEF. = 2.515
AVG. INCIDENCE = 5.81 DEG.

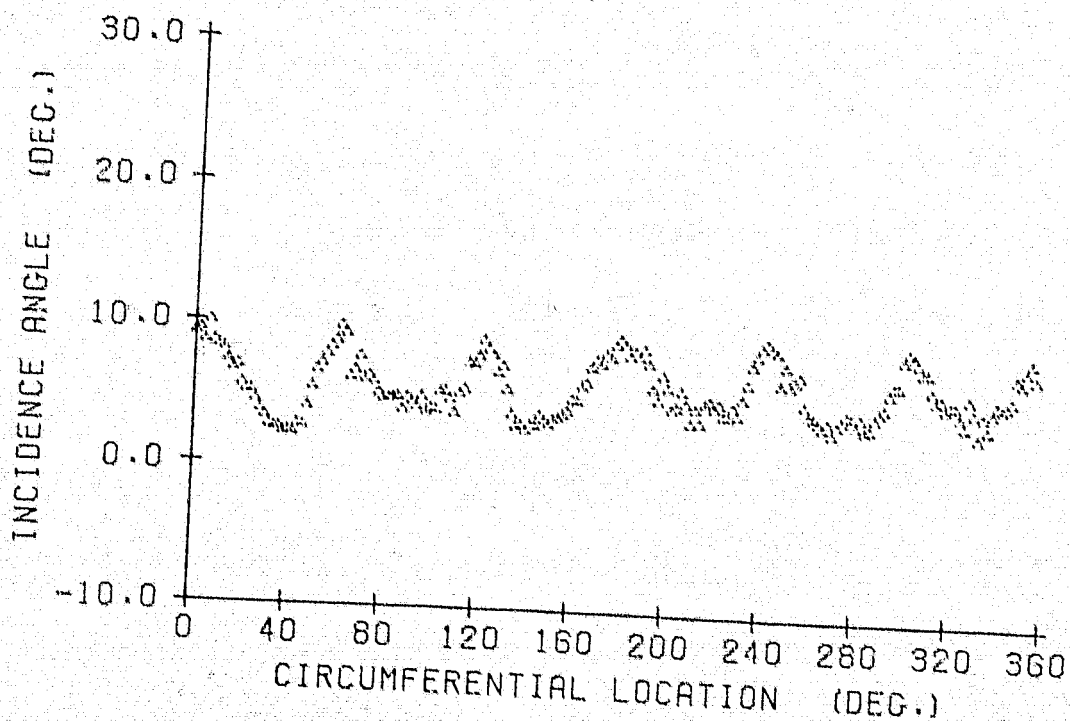


Figure E.66

9 BLADES
30 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1562

AVG. FLOW COEF. = 0.618
AVG. P-RISE COEF. = 1.301
AVG. INCIDENCE = 2.09 DEG.

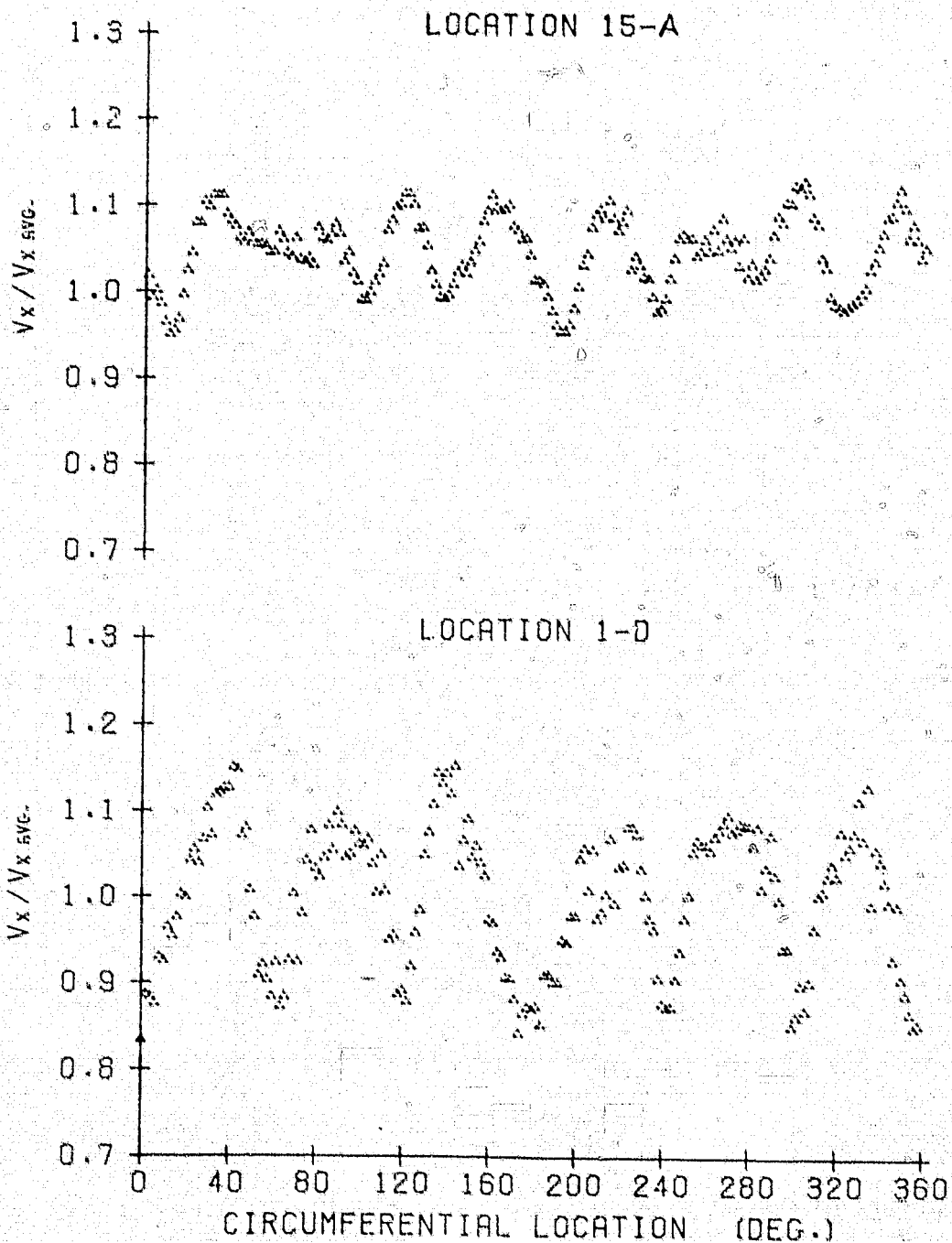


Figure E.67

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1562

AVG. FLOW COEF. = 0.618
AVG. P-RISE COEF. = 1.301
AVG. INCIDENCE = 2.09 DEG.

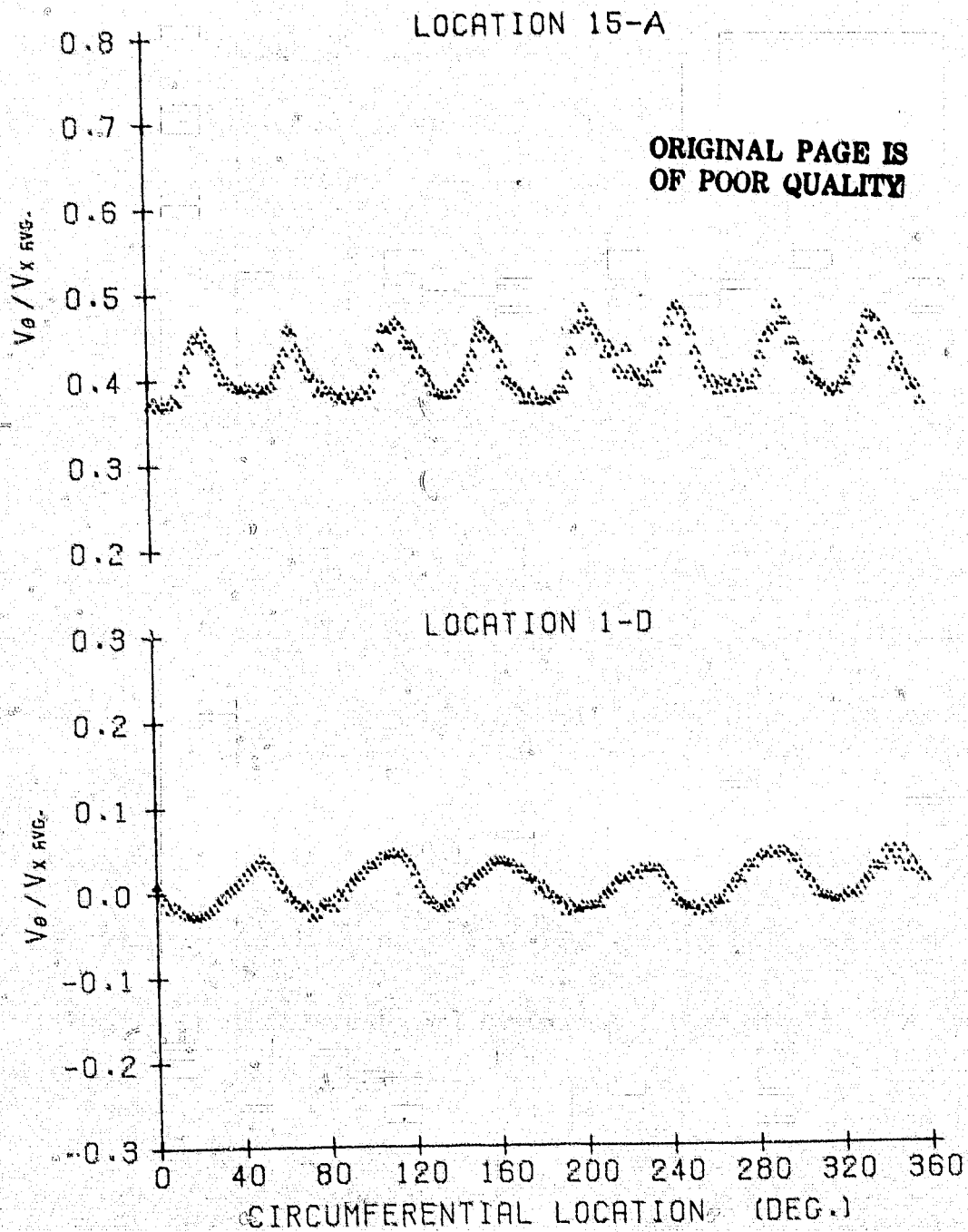


Figure E.68

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10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1562

AVG. FLOW COEF. = 0.618
AVG. P-RISE COEF. = 1.301
AVG. INCIDENCE = 2.09 DEG.

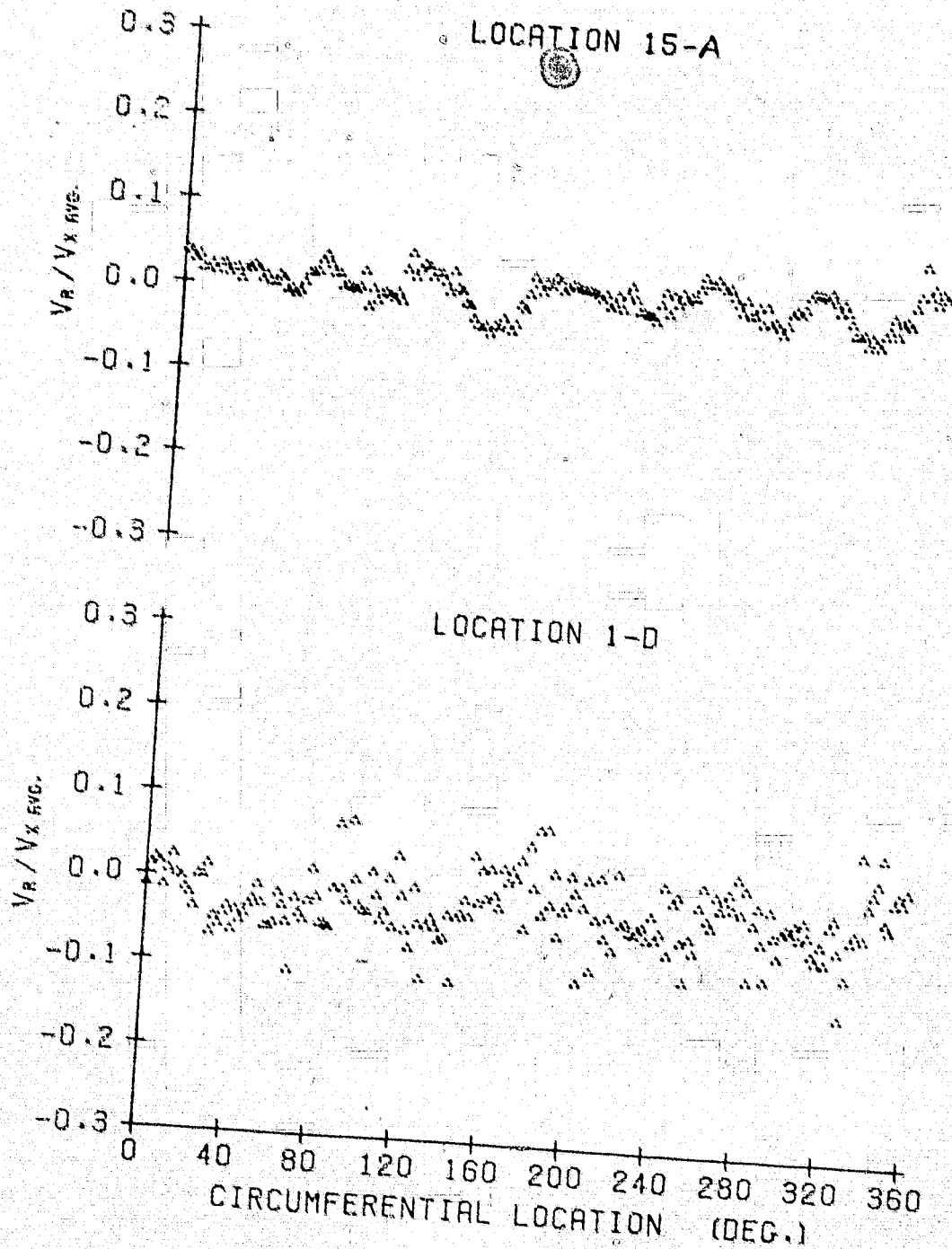


Figure E.69

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1562

AVG. FLOW COEF. = 0.618
AVG. P-RISE COEF. = 1.301
AVG. INCIDENCE = 2.09 DEG.

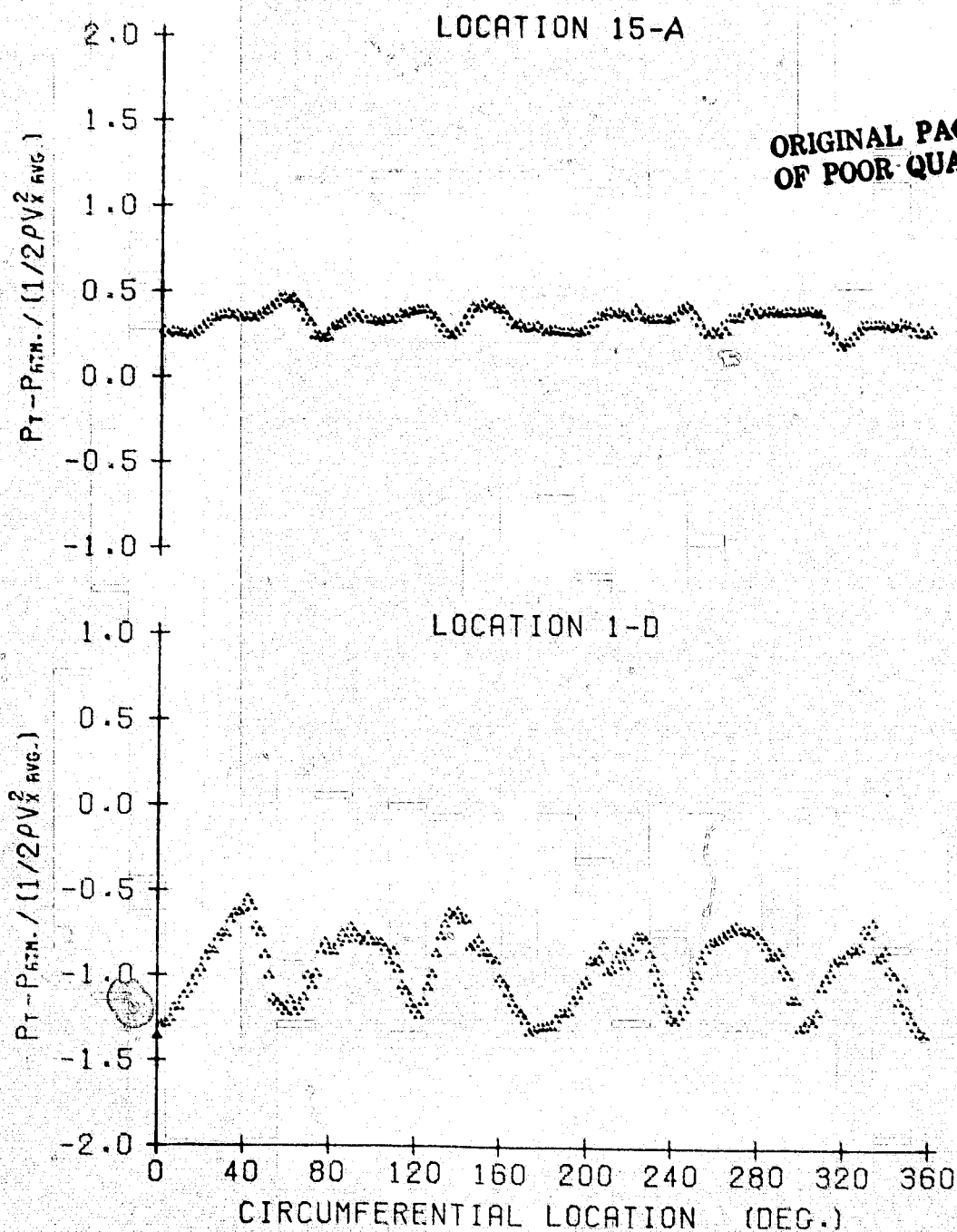


Figure E.70

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1562

AVG. FLOW COEF. = 0.618
AVG. P-RISE COEF. = 1.301
AVG. INCIDENCE = 2.09 DEG.

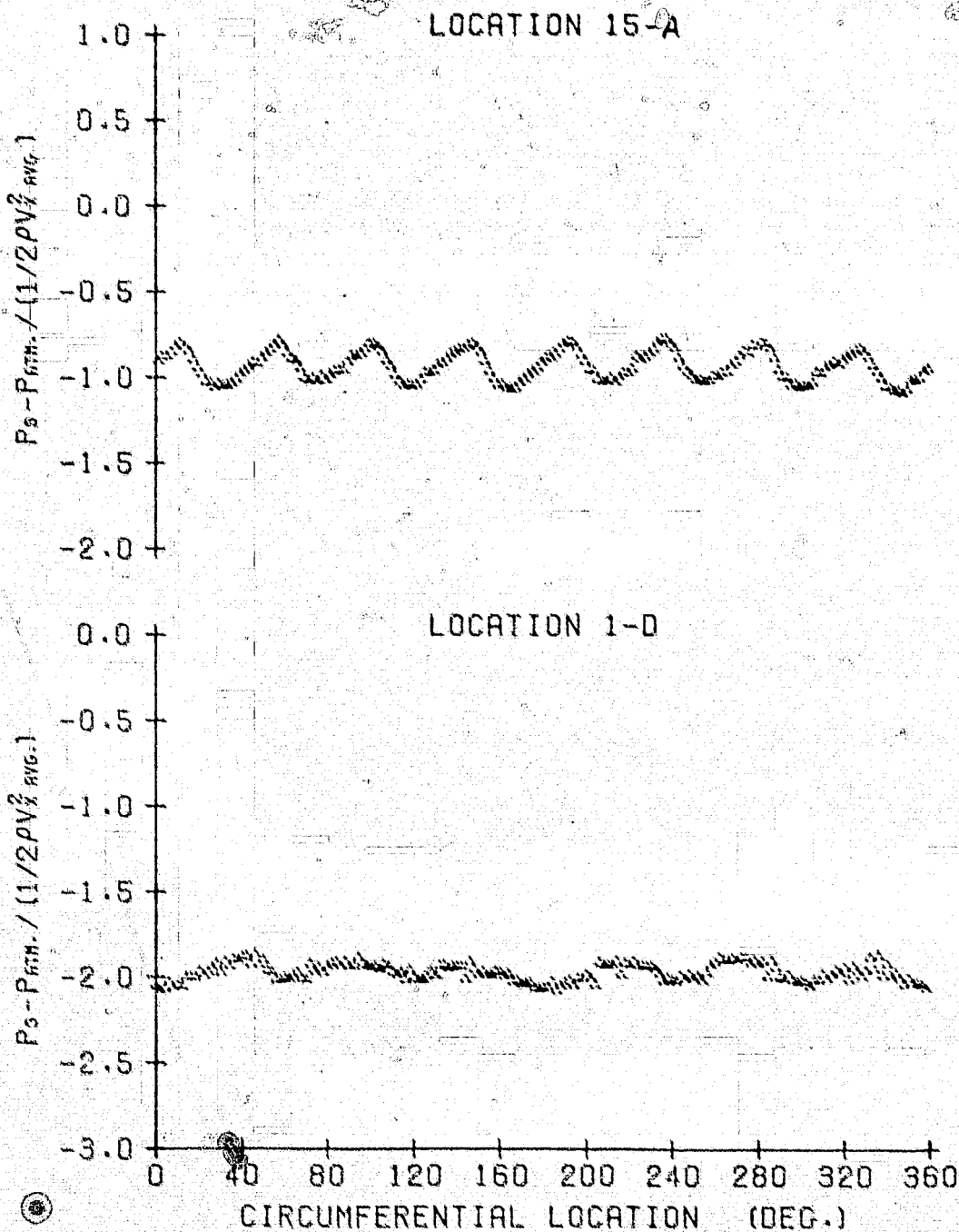


Figure E.71

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9 BLADES
50 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1562

AVG. FLOW COEF. = 0.618
AVG. P-RISE COEF. = 1.301
AVG. INCIDENCE = 2.09 DEG.

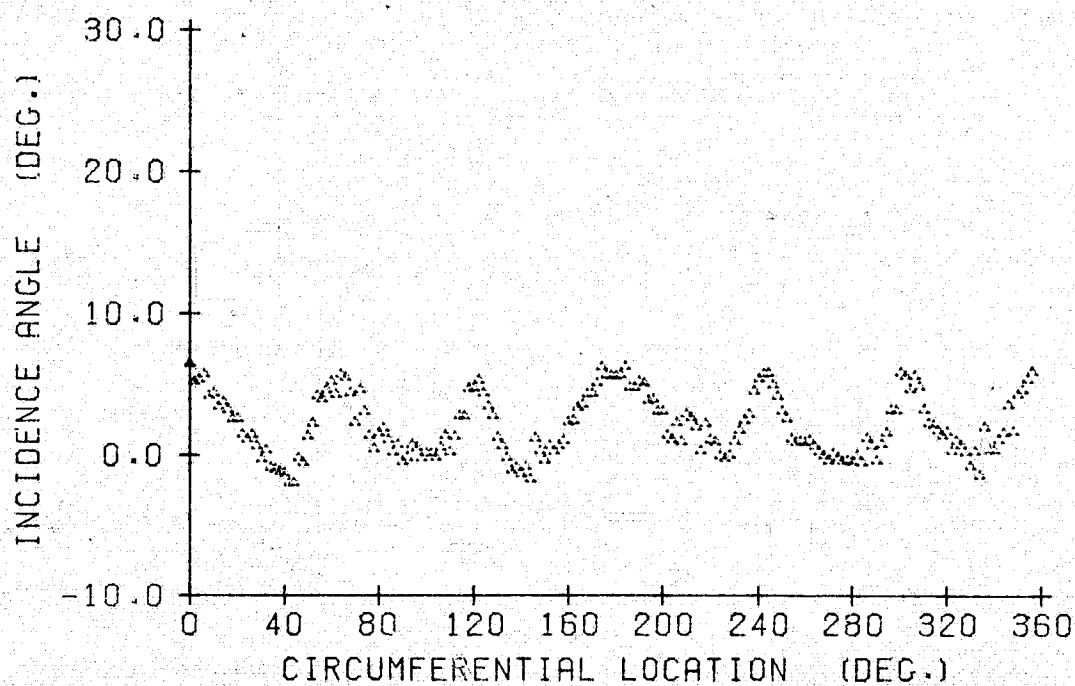


Figure E.72

10 October 1978
LGB:jep

9 BLADES
60 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1741

AVG. FLOW COEF. = 0.536
AVG. P-RISE COEF. = 2.133
AVG. INCIDENCE = 5.61 DEG.

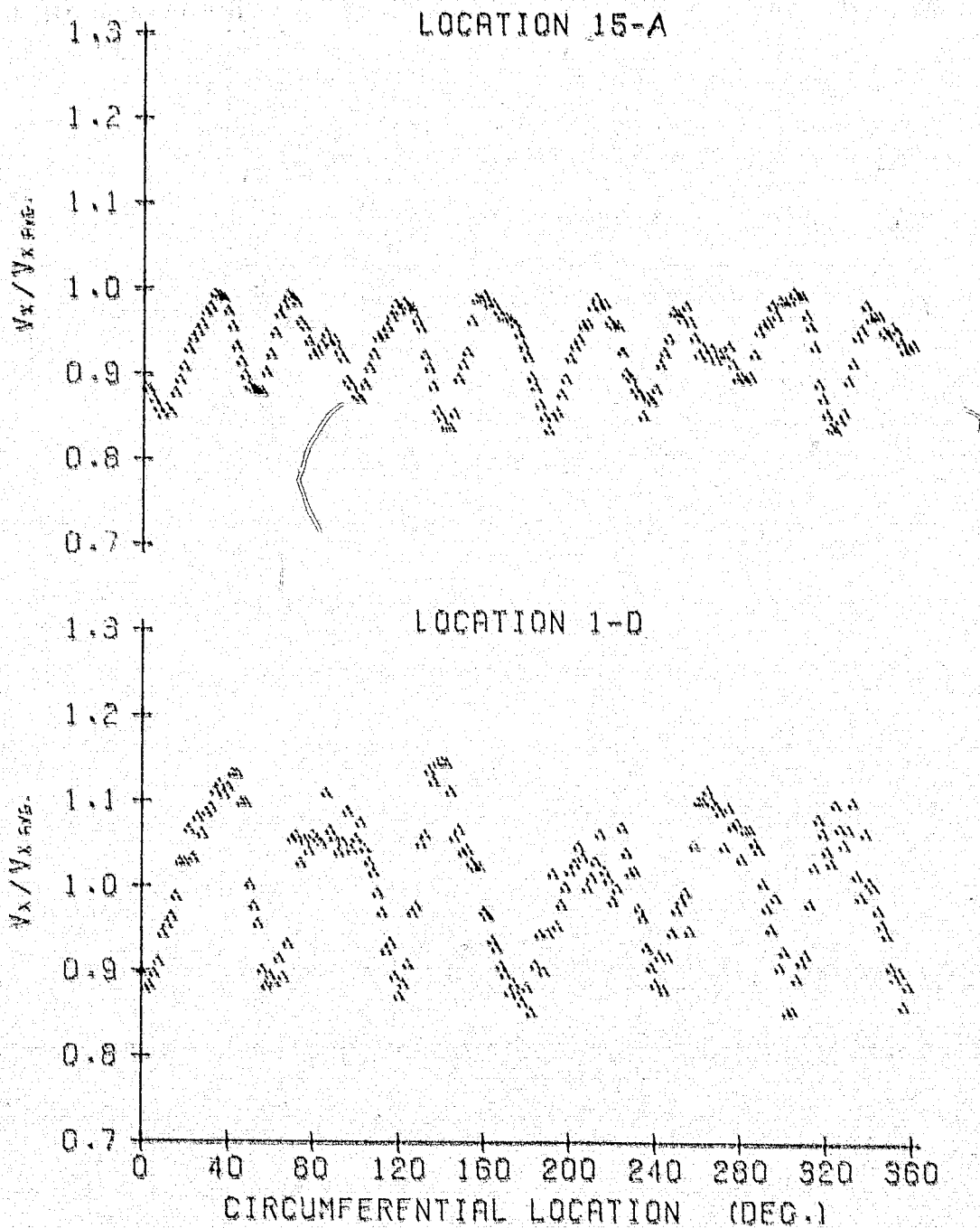


Figure E.73

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1741

AVG. FLOW COEFF. = 0.536
AVG. P-RISE COEF. = 2.133
AVG. INCIDENCE = 5.61 DEG.

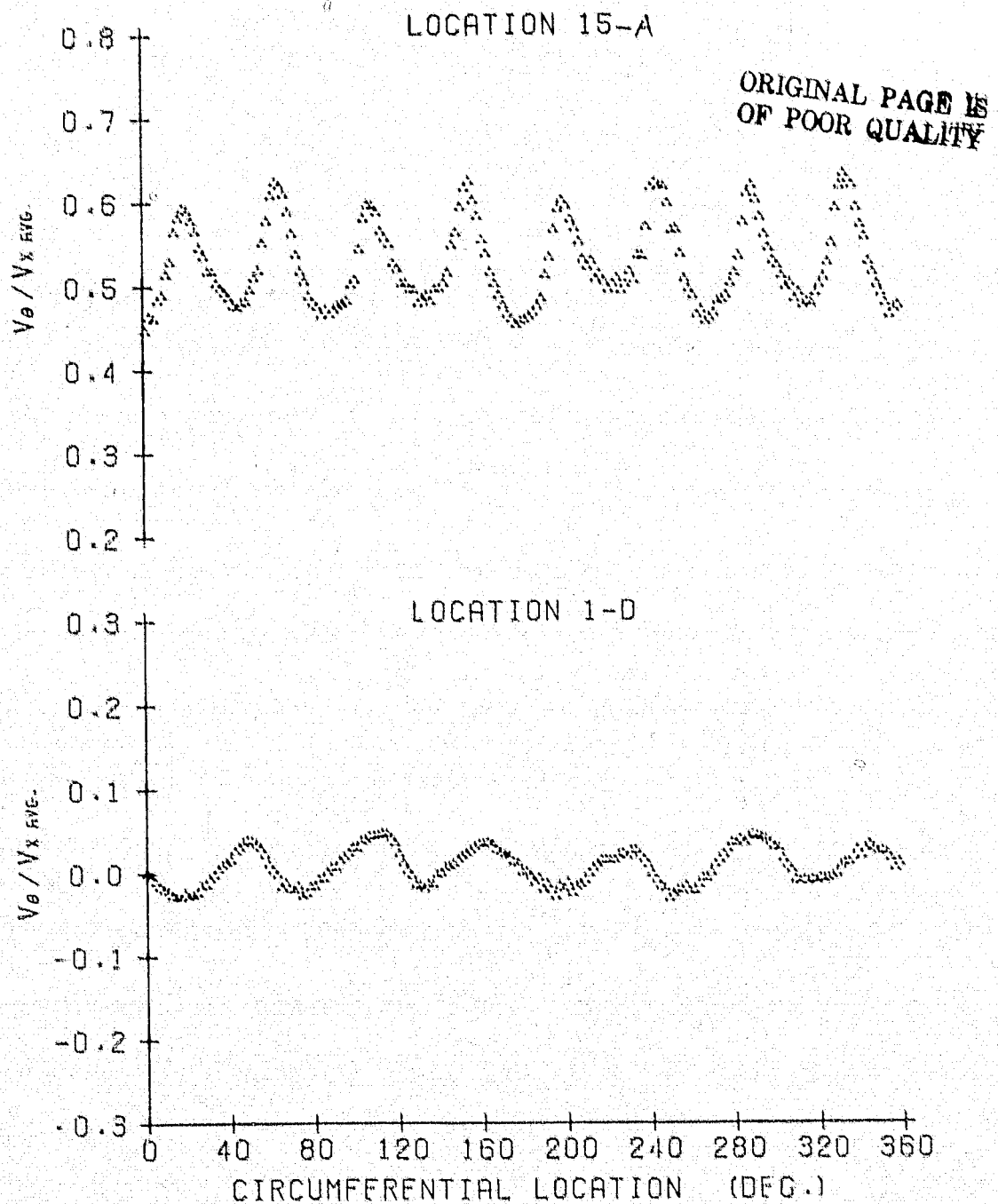


Figure E.74

10 October 1978
LGB:jep

9 BLADES
50 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1741

AVG. FLOW COEFF. = 0.536
AVG. P-RISE COEFF. = 2.133
AVG. INCIDENCE = 5.61 DEG.

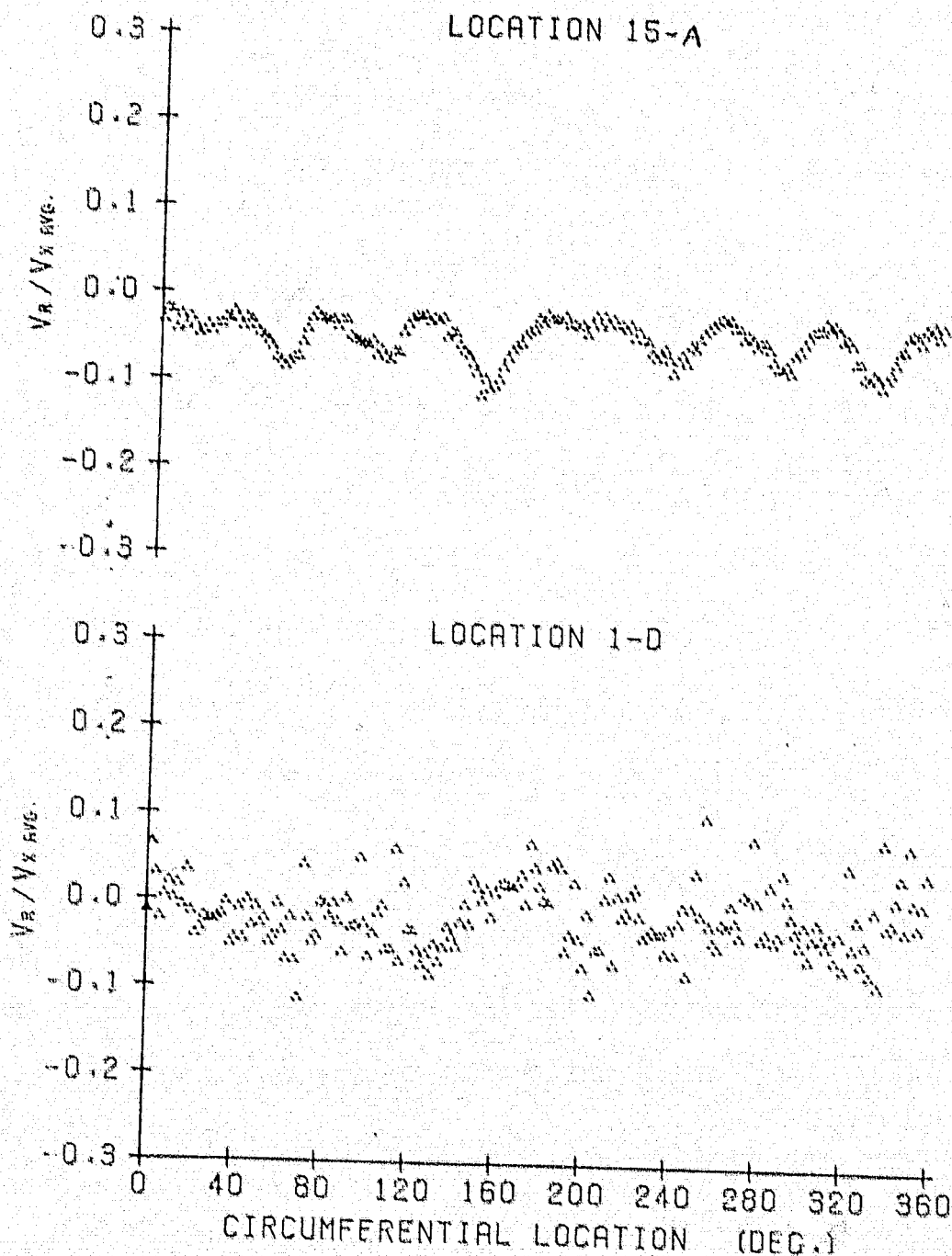


Figure E.75

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1741

AVG. FLOW COEF. = 0.536
AVG. P-RISE COEF. = 2.133
AVG. INCIDENCE = 5.61 DEG.

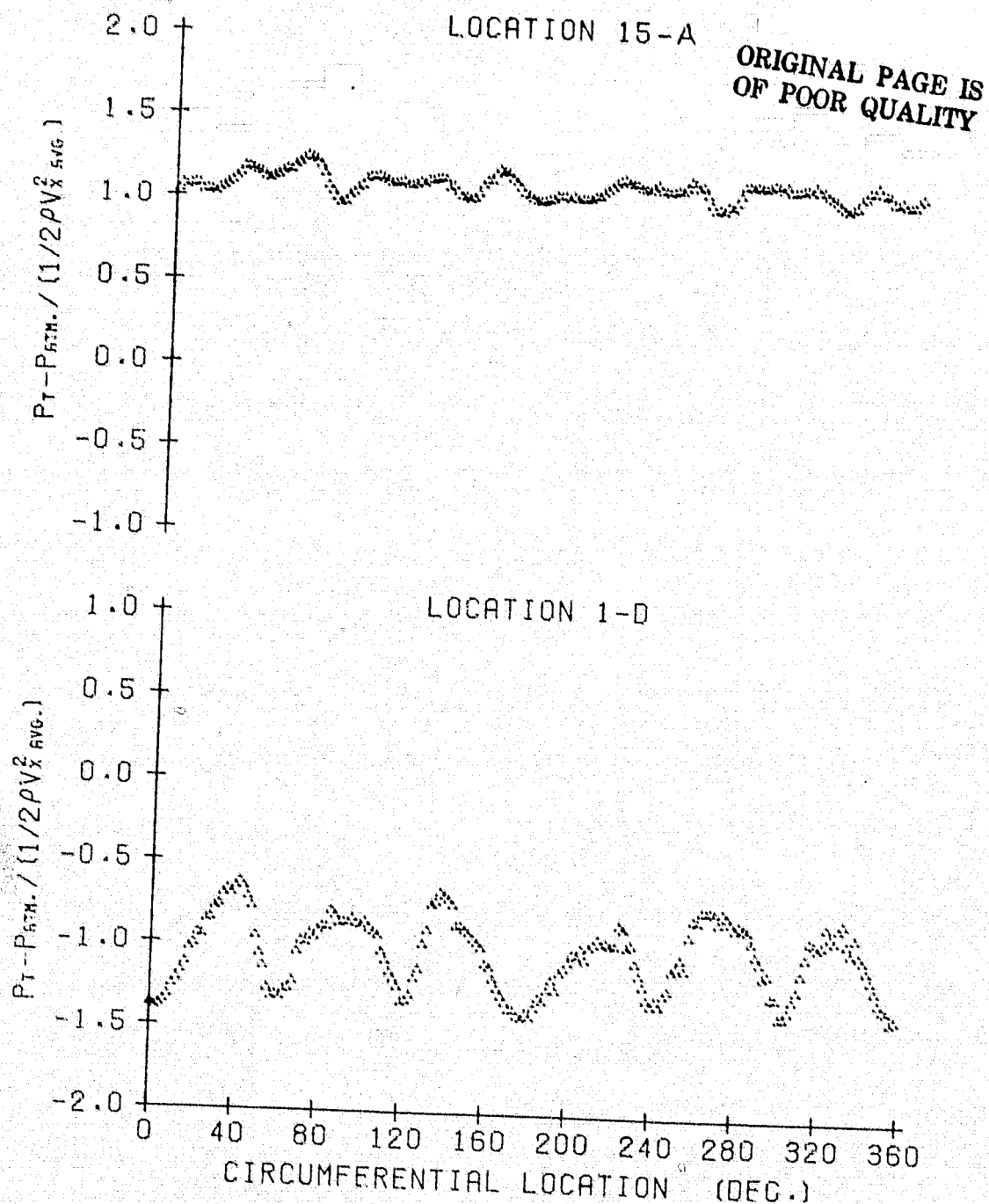


Figure E.76

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM - 1741

AVG. FLOW COEF. = 0.536
AVG. P-RISE COEF. = 2.133
AVG. INCIDENCE = 5.61 DEG.

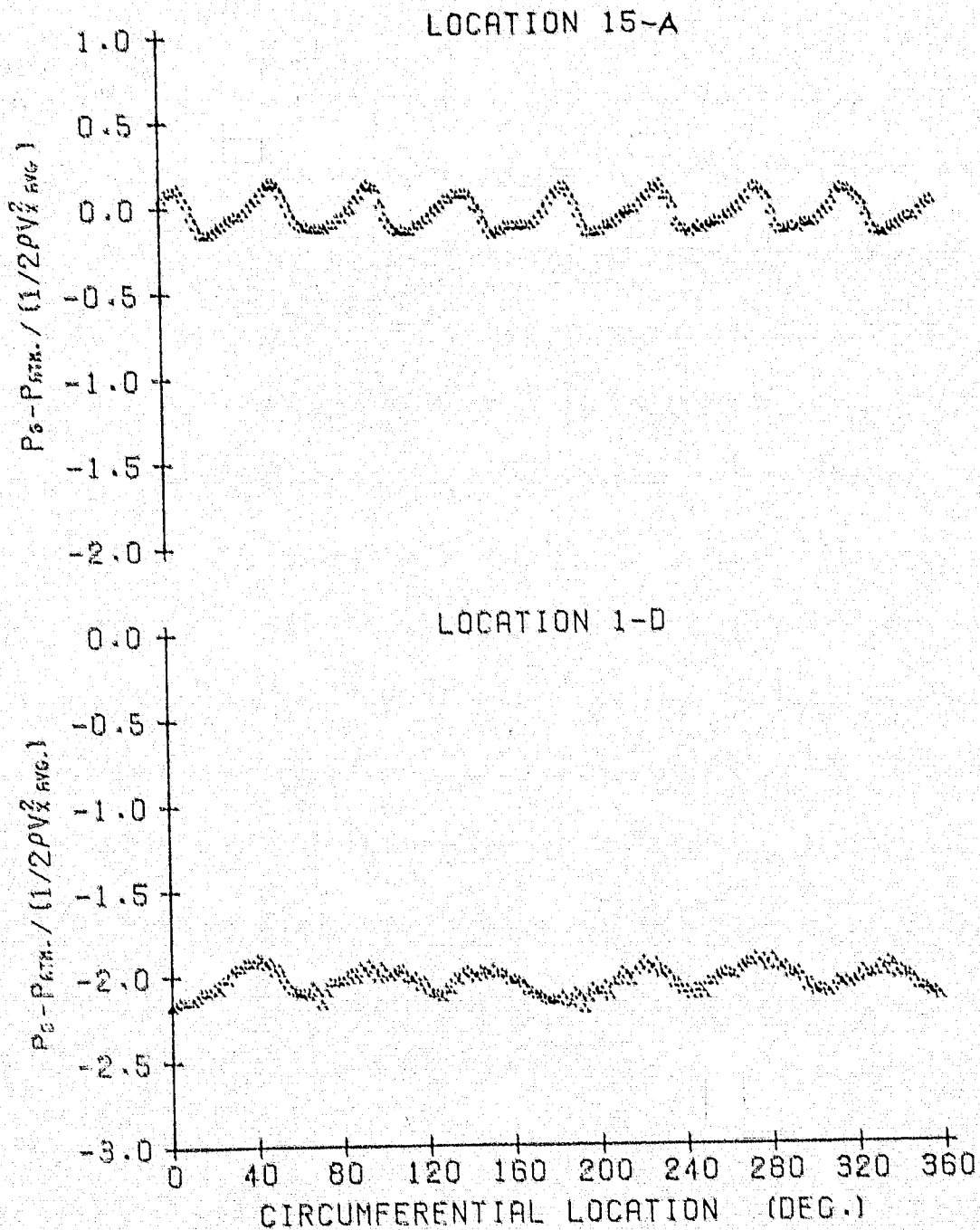


Figure E.77

10 October 1978
LCB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1741

AVG. FLOW COEF. = 0.536
AVG. P-RISE COEF. = 2.133
AVG. INCIDENCE = 5.61 DEG.

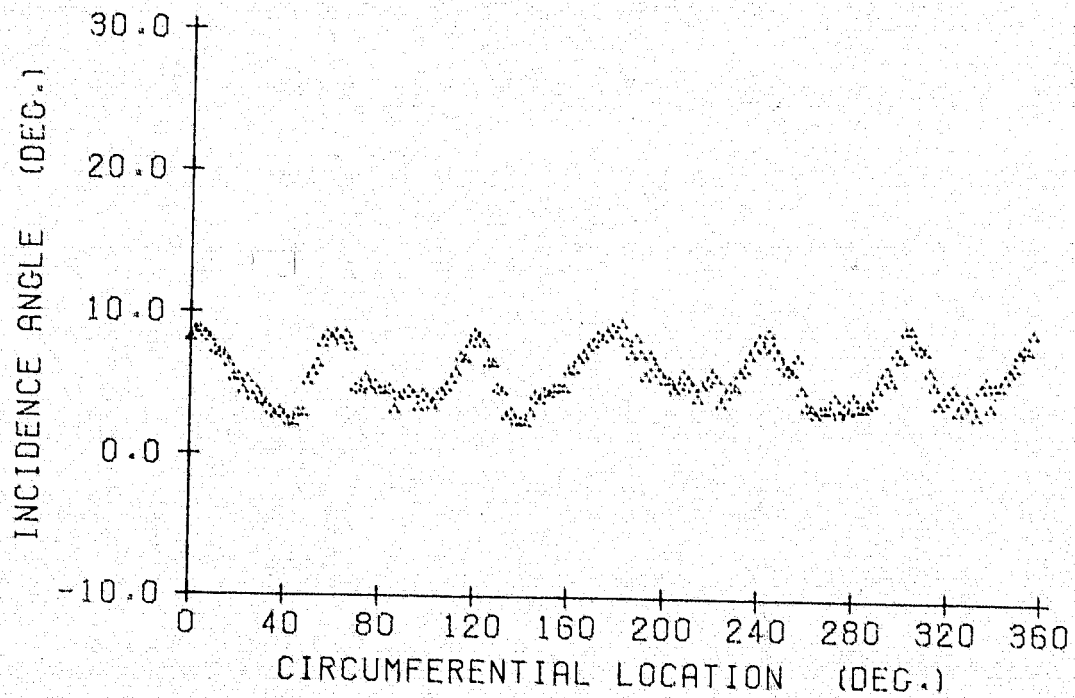


Figure E.78

10 October 1978

LCB:jep

3. FLARE
50 DEG. STAGGER ANGLE
9 CYCLE DISTORTION
RPM = 1882

AVG. FLOW COEF. = 0.541
AVG. P-RISE COEF. = 2.305
AVG. INCIDENCE = 5.40 DEG.

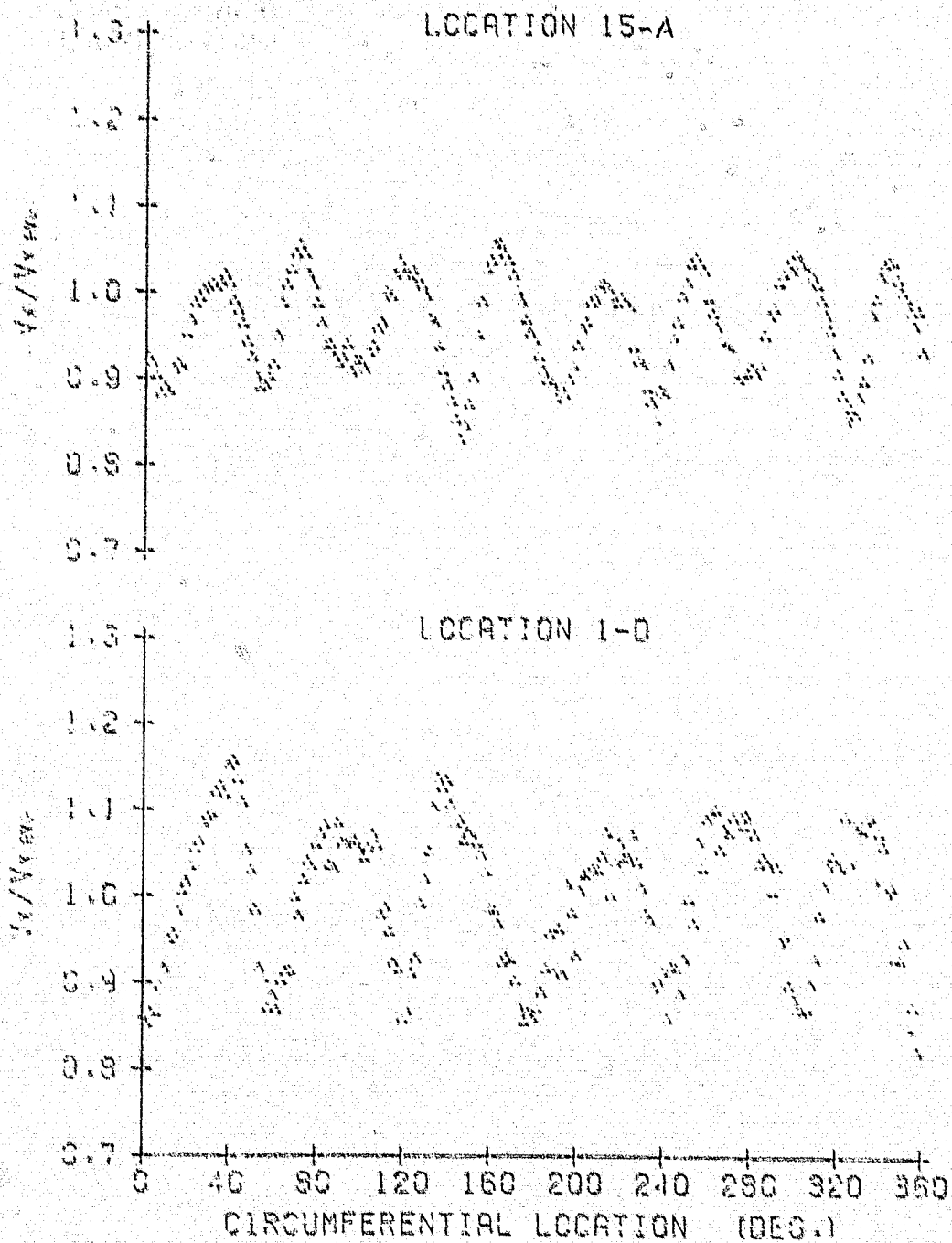


Figure E.79

9 BLADES
50 DEG. STAGGER ANGLE
0 CYCLE DISTORTION
RPM = 1882

AVG. FLOW COEF. = 0.541
AVG. P-RISE COEF. = 2.305
AVG. INCIDENCE = 5.40 DEG.

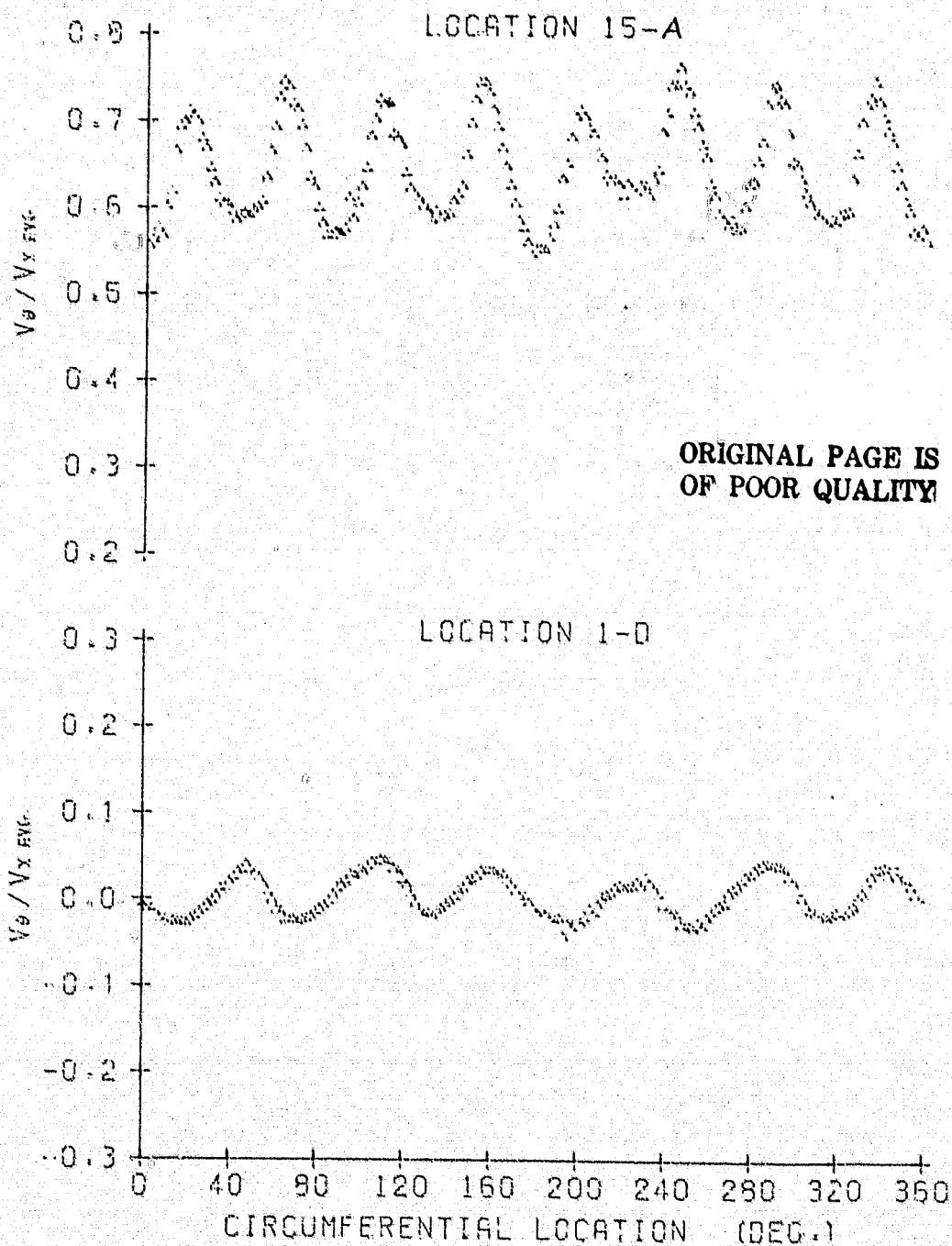


Figure E.80

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10 October 1978
LCB:jep

9 BLADES
50 DEG STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1882

AVG. FLOW COEF. = 0.541
AVG. P-RISE COEF. = 2.305
AVG. INCIDENCE = 5.40 DEG.

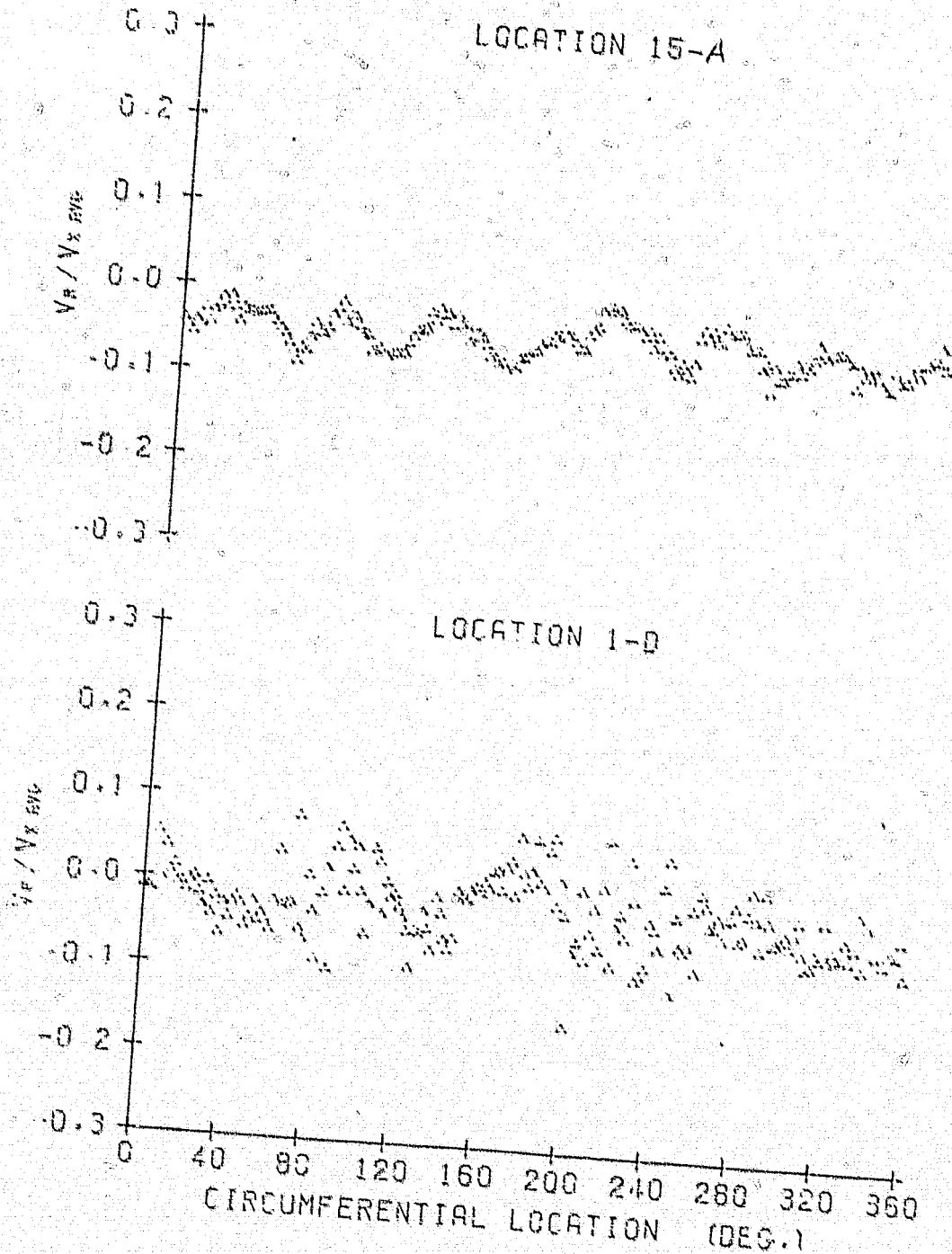


Figure E.81

10 October 1978
LCB:jep

0° BLADES
50 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1882

AVG. FLOW COEF. = 0.541
AVG. P-RISE COEF. = 2.305
AVG. INCIDENCE = 5.40 DEG.

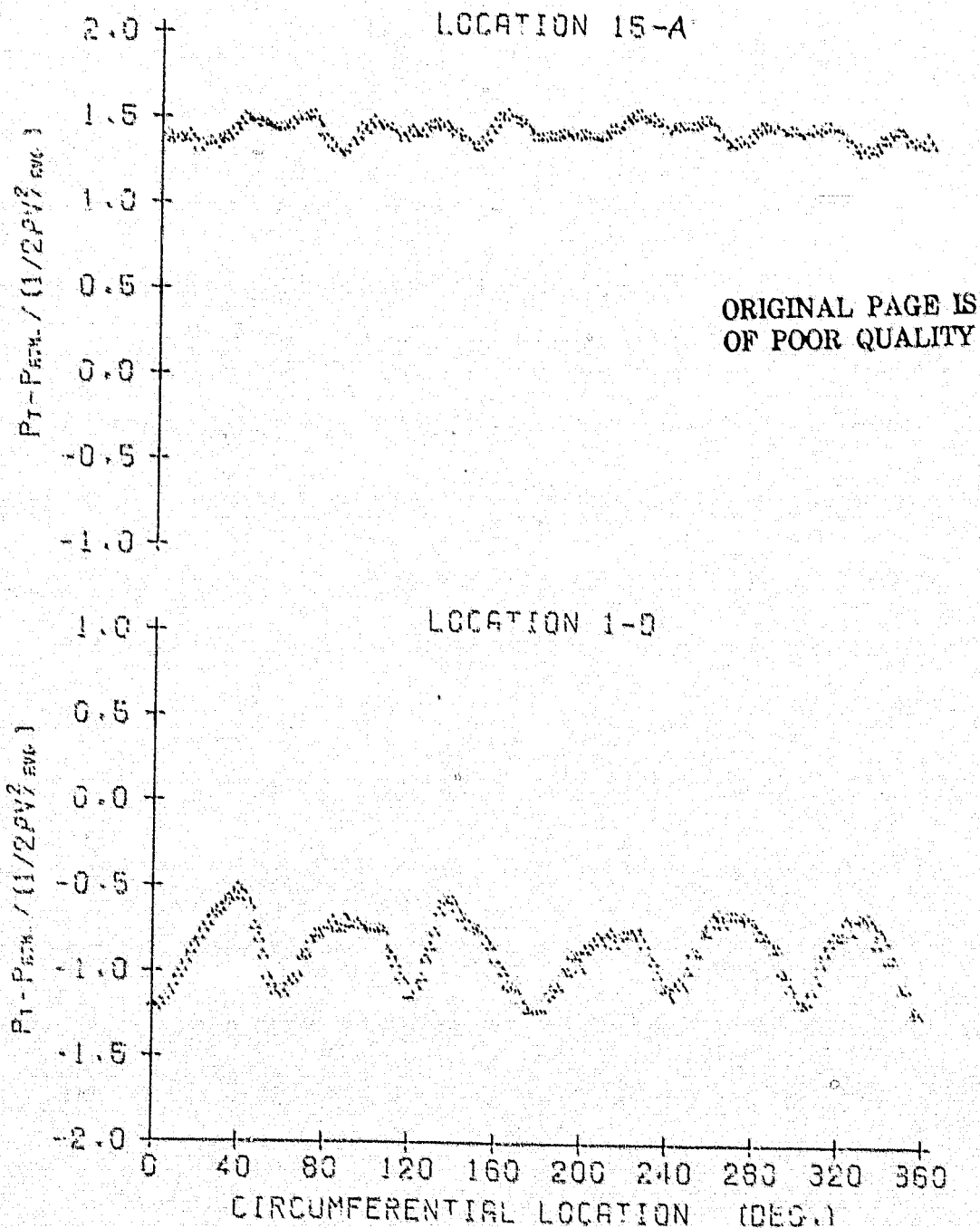


Figure E.82

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM : 1892

AVG. FLOW COEF. = 0.541
AVG. P-RISE COEF. = 2.305
AVG. INCIDENCE = 5.40 DEG.

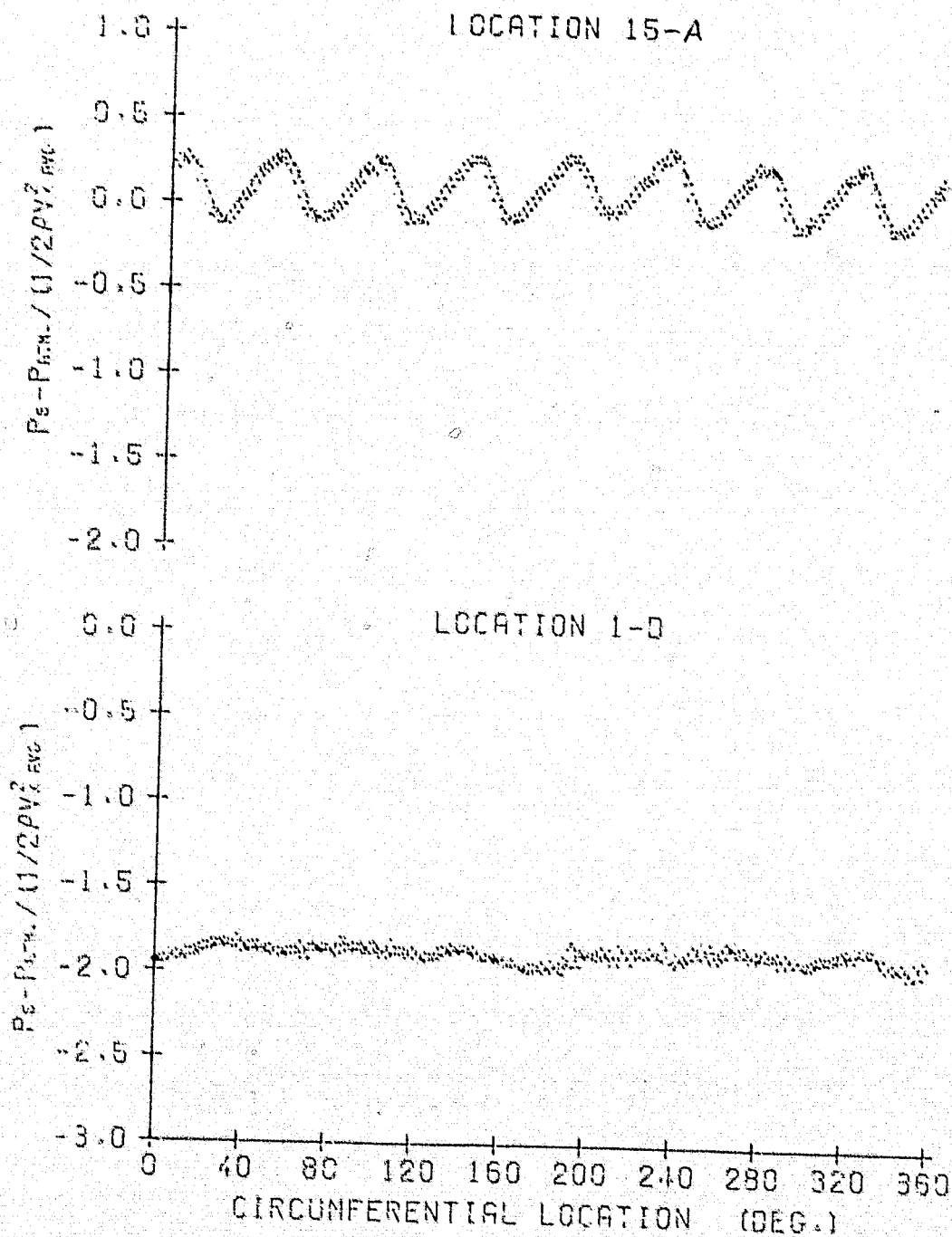


Figure E.83

10 October 1978
LGB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
6 CYCLE DISTORTION
RPM = 1882

AVG. FLOW COEF. = 0.541
AVG. P-RISE COEF. = 2.305
AVG. INCIDENCE = 5.40 DEG.

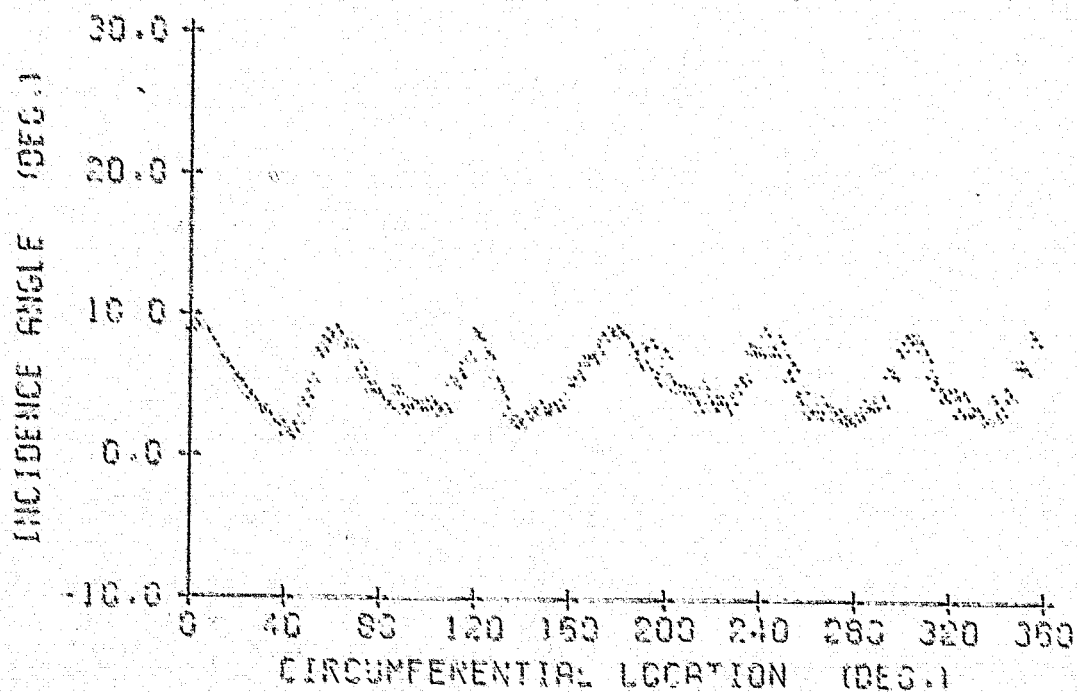


Figure E.84

Appendix F

Data for the 90 Degree Square Distortion

Table F.1

Test Conditions for the 90 Degree Square Distortion

Figure Numbers	Solidity	Rotor/Stator Spacing	Distance from Hub Surface
F.1-F.6	0.74	—	2.75 in. (6.985cm)
F.7-F.12	0.74	—	2.75 in.
F.13-F.18	0.74	—	2.75 in.
F.19-F.24	0.74	—	2.75 in.
F.25-F.30	0.74	—	2.75 in.
F.31-F.36	0.74	—	2.75 in.
F.37-F.42	0.74	—	2.75 in.
F.43-F.48	0.74	—	2.75 in.
F.49-F.54	1.11	12 in. (30.48cm)	2.75 in.
F.55-F.60	1.11	12 in.	2.75 in.
F.61-F.66	1.11	12 in.	2.75 in.
F.67-F.72	1.11	3 in. (7.62cm)	2.75 in.
F.73-F.78	1.11	3 in.	2.75 in.
F.79-F.84	1.11	3 in.	2.75 in.
F.85-F.90	0.90	12 in.	4.58 in. (11.64cm)
F.91-F.96	0.99	12 in.	3.67 in. (9.31cm)
F.97-F.102	1.26	12 in.	1.83 in. (4.66cm)
F.103-F.103	1.45	12 in.	0.92 in. (2.33cm)

Table F.1 (con't)

Test Conditions for the 90 Degree Square Distortion

Figure Numbers	No. of Blades	Stagger Angle (degrees)	$V_{xavginlet}$ (ft/sec)	$V_{xavgexit}$ (ft/sec)	RPM	Average ϕ	Average $\Delta P_T / \frac{1}{2} \rho V_{xavg}^2$	Average Incidence (degrees)
F.1-F.6	6	35	64.16	63.90	696	1.363	0.009	1.29
F.7-F.12	6	35	64.69	65.14	993	0.963	0.479	11.07
F.13-F.18	6	35	63.18	68.56	1143	0.817	0.847	15.75
F.19-F.24	6	45	66.52	65.97	994	0.990	0.027	0.34
F.25-F.30	6	45	67.12	66.37	1375	0.722	0.800	9.18
F.31-F.36	6	55	58.98	60.12	1419	0.615	0.145	3.02
F.37-F.42	6	55	61.66	63.52	1653	0.552	0.785	5.57
F.43-F.48	6	55	63.75	65.64	1950	0.483	1.787	8.84
F.49-F.54	9	50	63.36	66.09	1521	0.616	1.260	2.08
F.55-F.60	9	50	65.78	65.87	1695	0.574	1.800	3.84
F.61-F.66	9	50	64.89	62.98	1833	0.523	2.494	6.09
F.67-F.72	9	50	62.17	67.26	1521	0.604	1.360	2.70
F.73-F.78	9	50	65.71	64.70	1695	0.573	1.796	3.99
F.79-F.84	9	50	64.65	62.98	1833	0.522	2.482	6.28
F.85-F.90	9	50	60.92	61.19	1695	0.531	2.255	5.86
F.91-F.96	9	50	61.85	60.46	1695	0.540	2.118	5.53
F.97-F.102	9	50	62.02	61.08	1695	0.541	2.062	5.36
F.103-F.108	9	50	63.60	59.85	1695	0.555	1.917	4.70

10 October 1978
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6 BLADES
35 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 696

AVG. FLOW COEF. = 1.363
AVG. P-RISE COEF. = 0.009
AVG. INCIDENCE = 1.29 DEG.

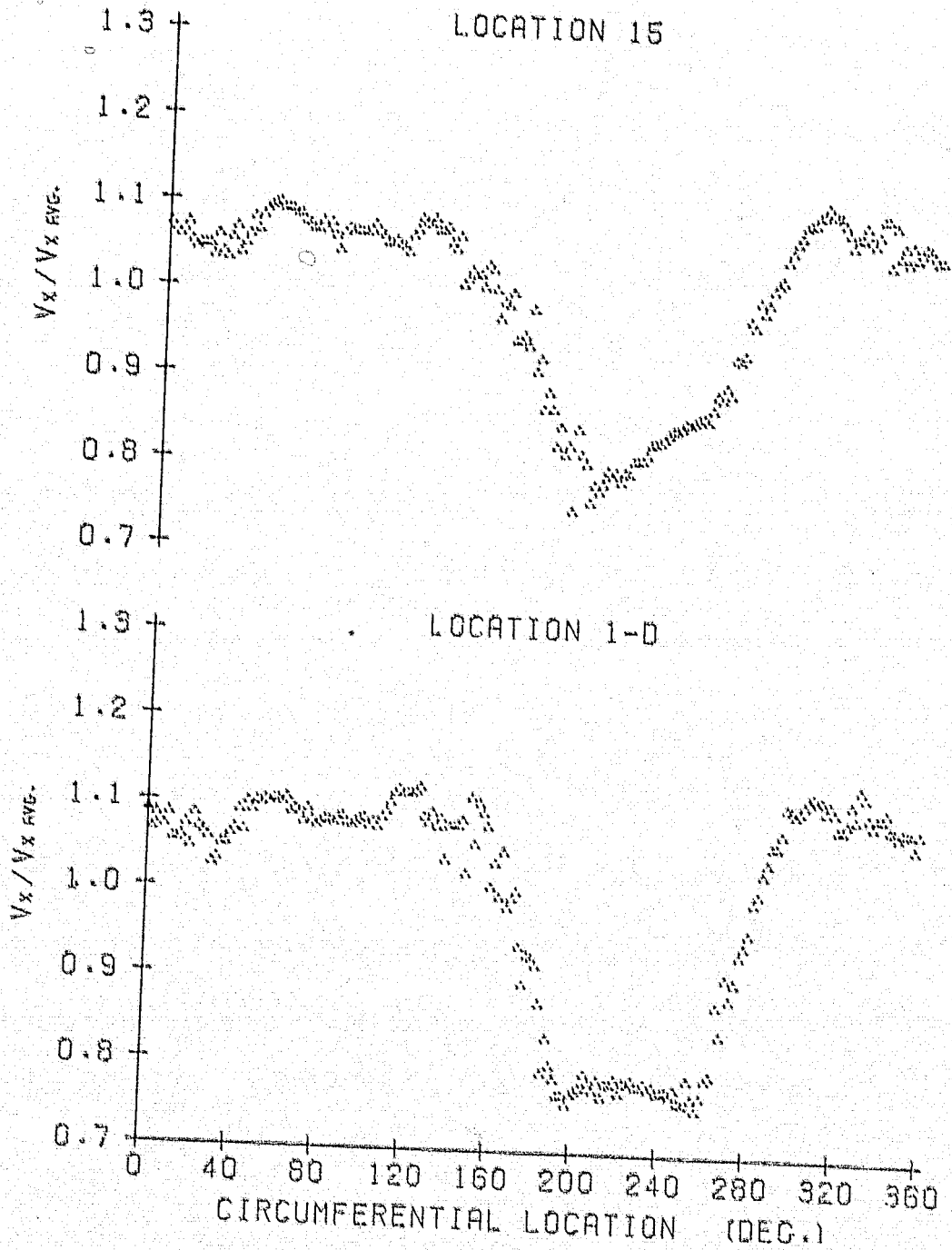


Figure F.1

10 October 1978
LCB:jep

1 BLADES
35 DEG. STAGGER ANGLE
30 DEG. SQ. DISTORTION
REF. 696

AVG. FLOW COEF. = 1.363
AVG. P-RISE COEF. = 0.009
AVG. INCIDENCE = 1.29 DEG.

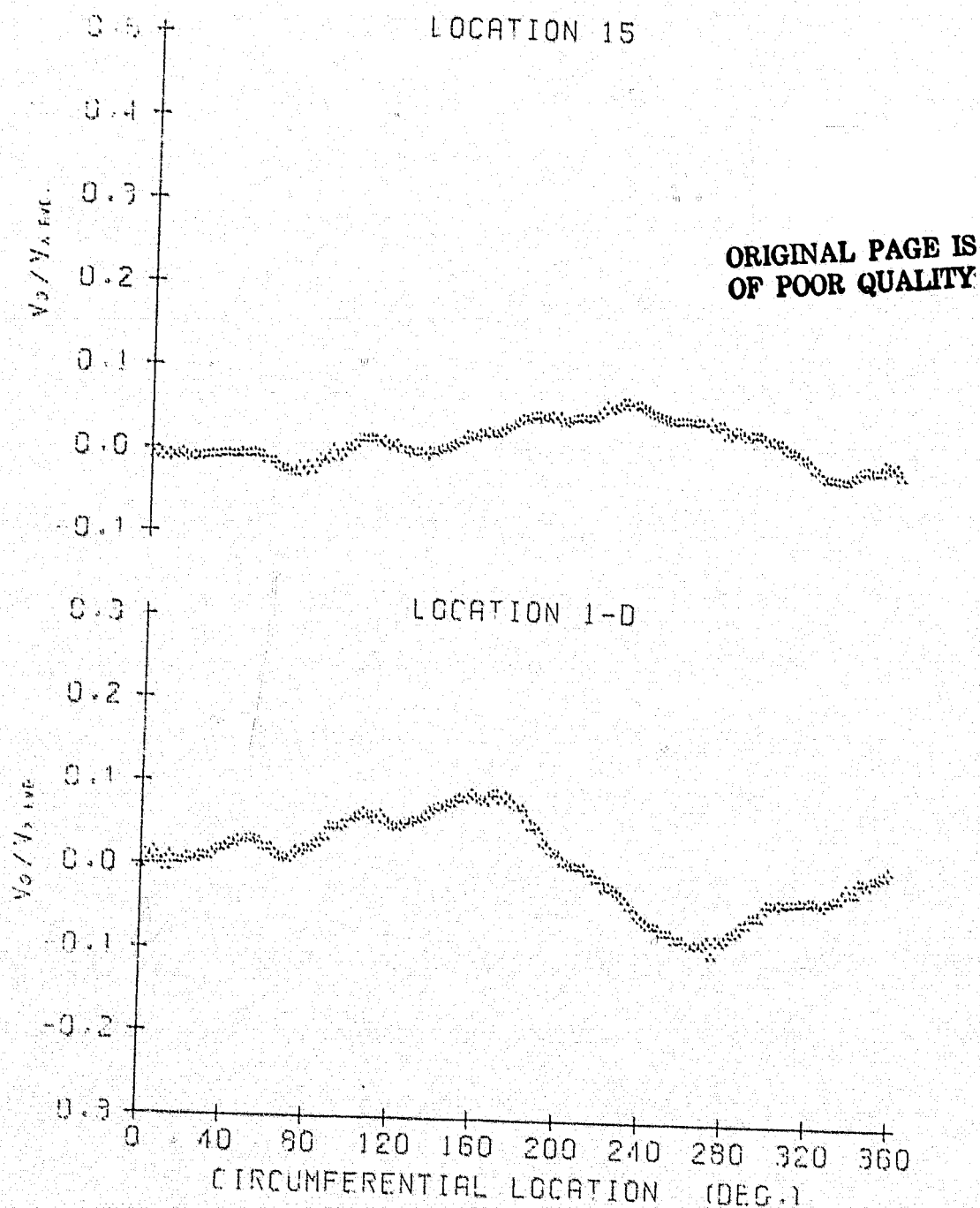


Figure F.2

10 October 1978

LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 696

AVG. FLOW COEF. = 1.363
AVG. P-RISE COEF. = 0.009
AVG. INCIDENCE = 1.29 DEG.

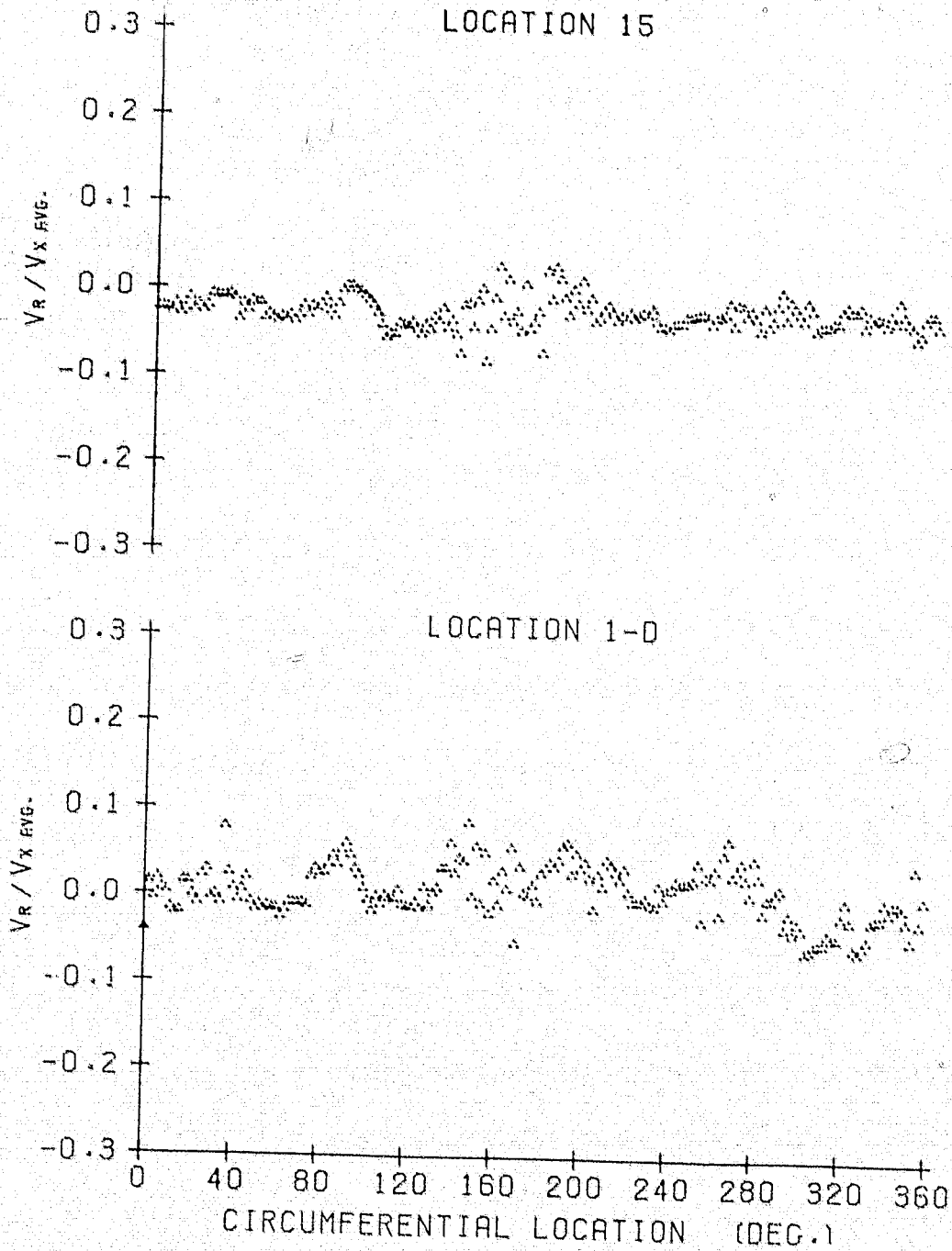


Figure F.3

10 October 1978
LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 696

AVG. FLOW COEF. = 1.363
AVG. P-RISE COEF. = 0.009
AVG. INCIDENCE = 1.29 DEG.

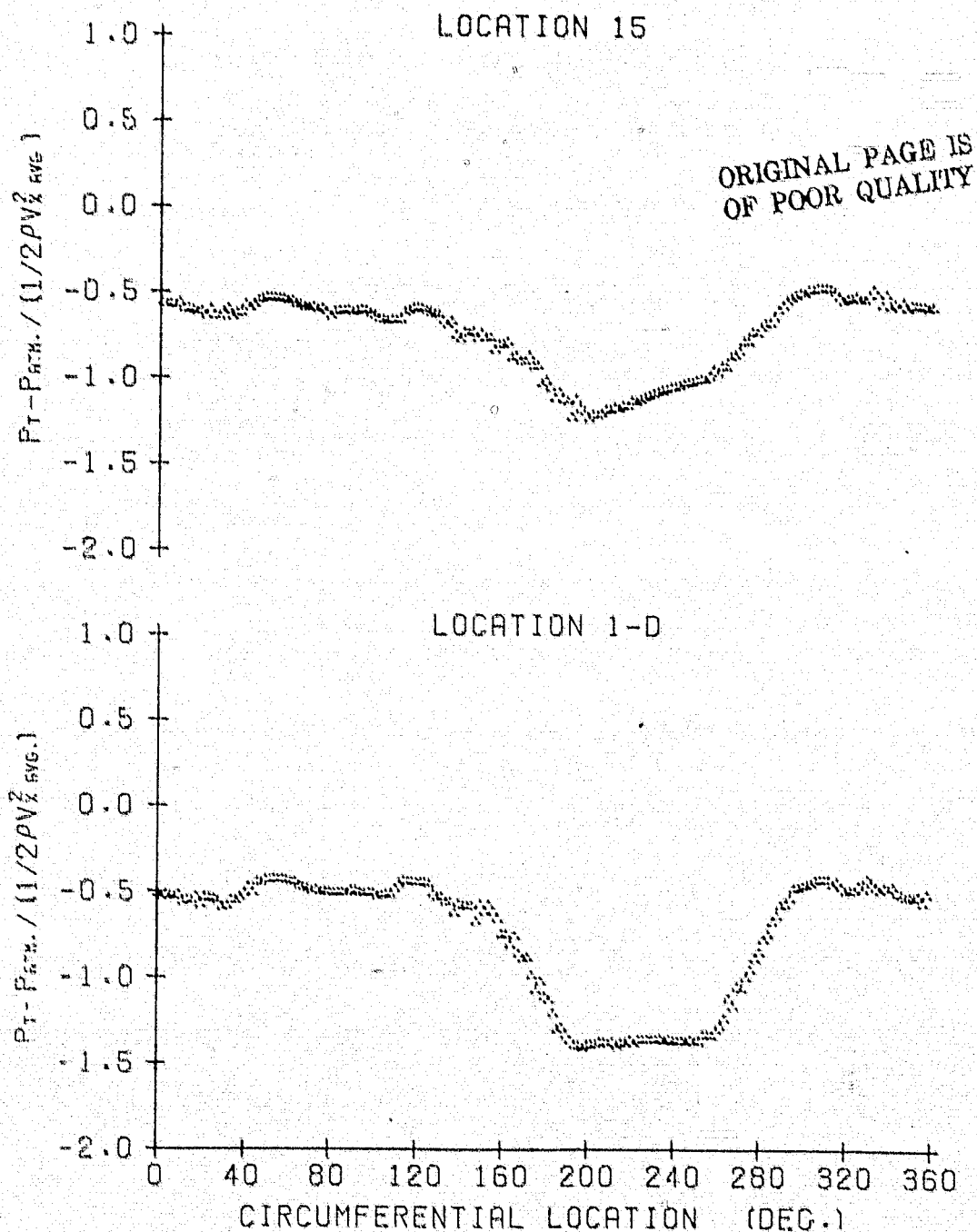


Figure F.4

10 October 1978

LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 696

AVG. FLOW COEF. = 1.363
AVG. P-RISE COEF. = 0.009
AVG. INCIDENCE = 1.29 DEG.

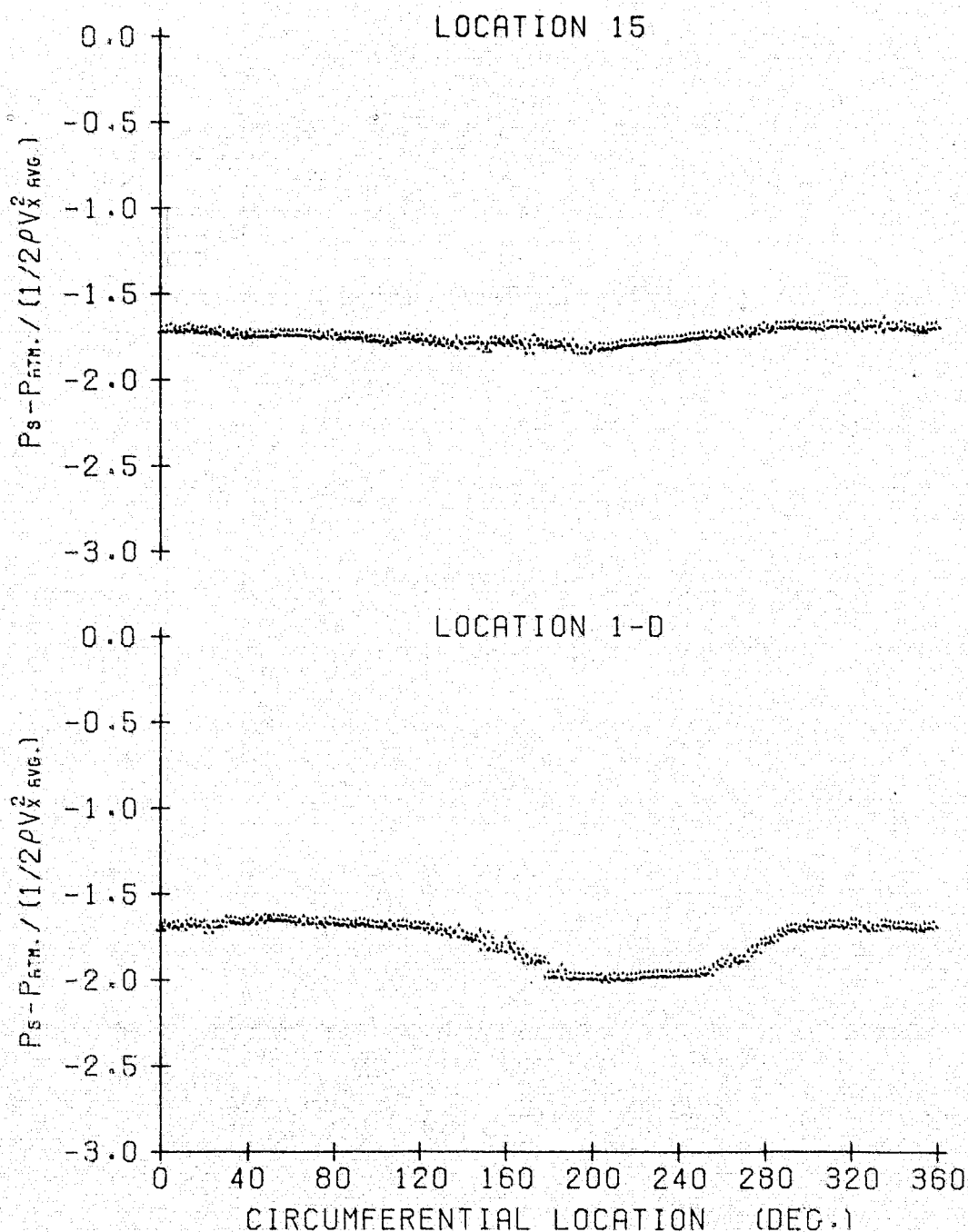


Figure F.5

10 October 1978
LCB:jep

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6 BLADES
35 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 696
AVG. FLOW COEF. = 1.363
AVG. P-RISE COEF. = 0.009
AVG. INCIDENCE = 1.29 DEG.

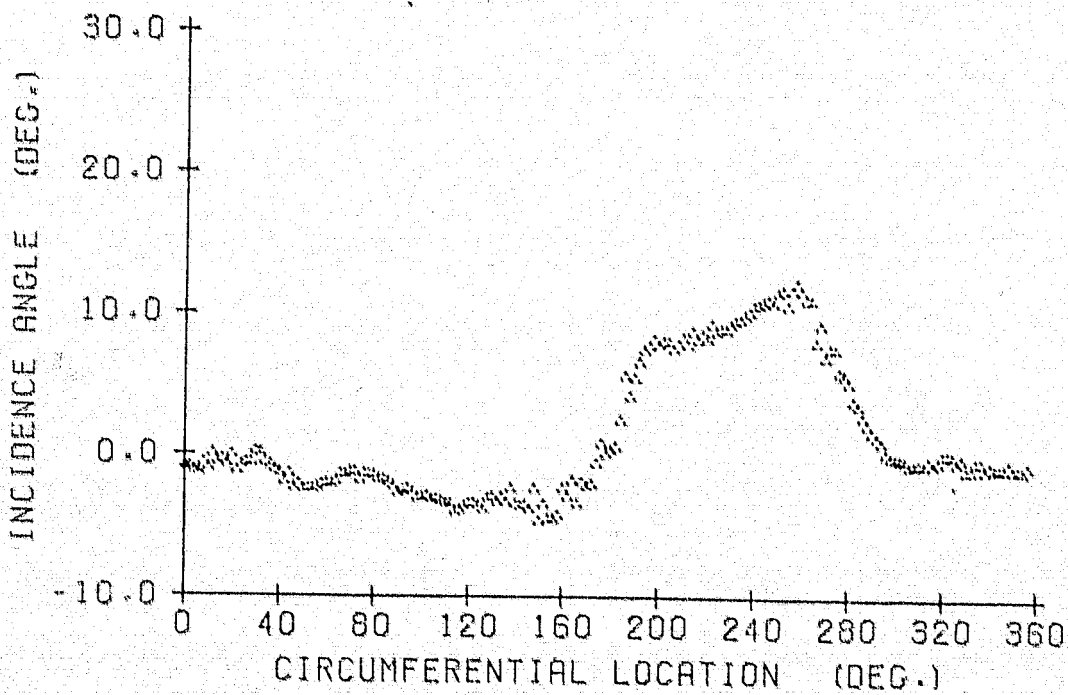


Figure F.6

10 October 1978
LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 993

AVG. FLOW COEF. = 0.963
AVG. P-RISE COEF. = 0.479
AVG. INCIDENCE = 11.07 DEG.

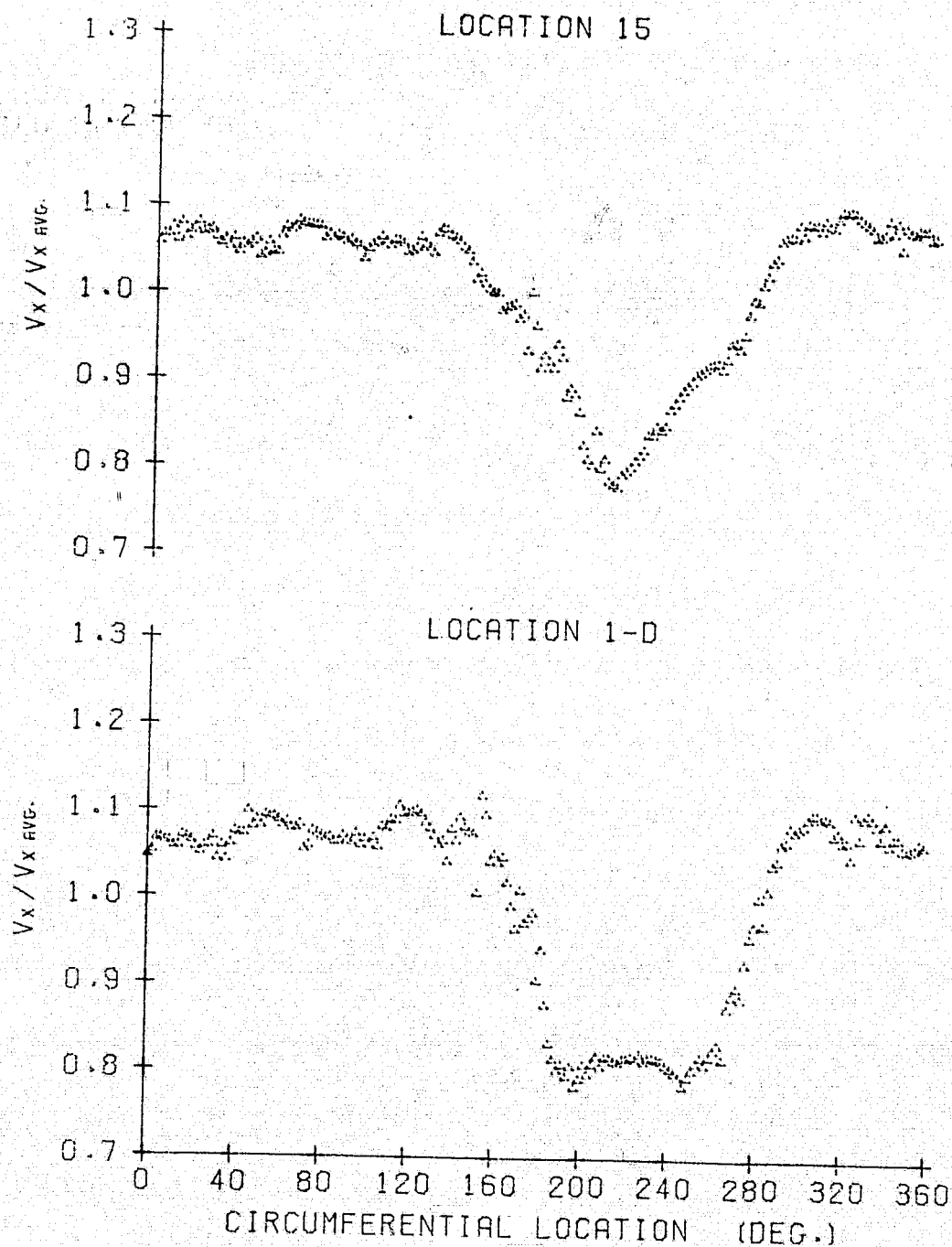


Figure F.7

10 October 1978
LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 993

AVG. FLOW COEF. = 0.963
AVG. P-RISE COEF. = 0.479
AVG. INCIDENCE = 11.07 DEG.

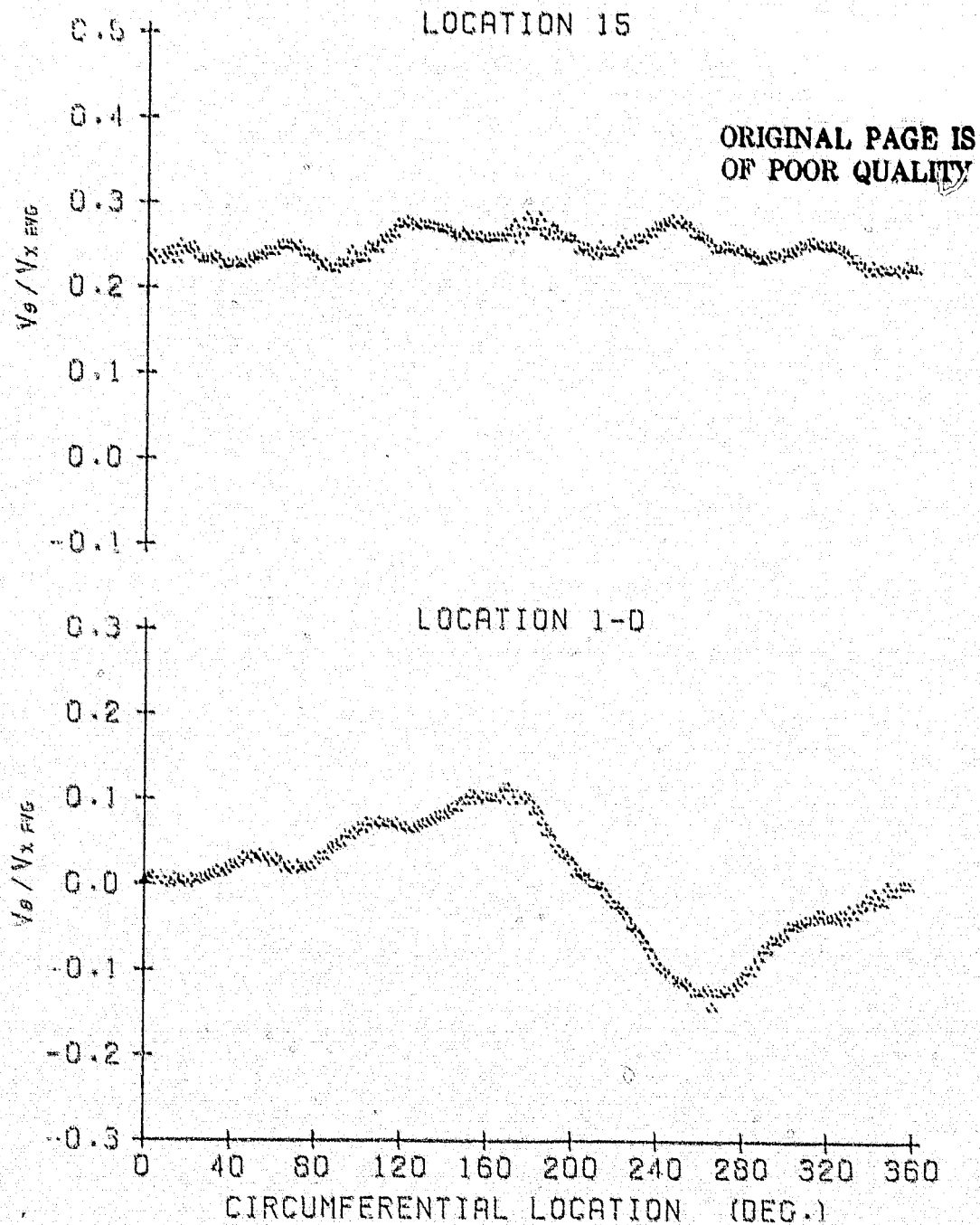


Figure F.8

10 October 1978
LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 993
AVG. FLOW COEF. = 0.963
AVG. P-RISE COEF. = 0.479
AVG. INCIDENCE = 11.07 DEG.

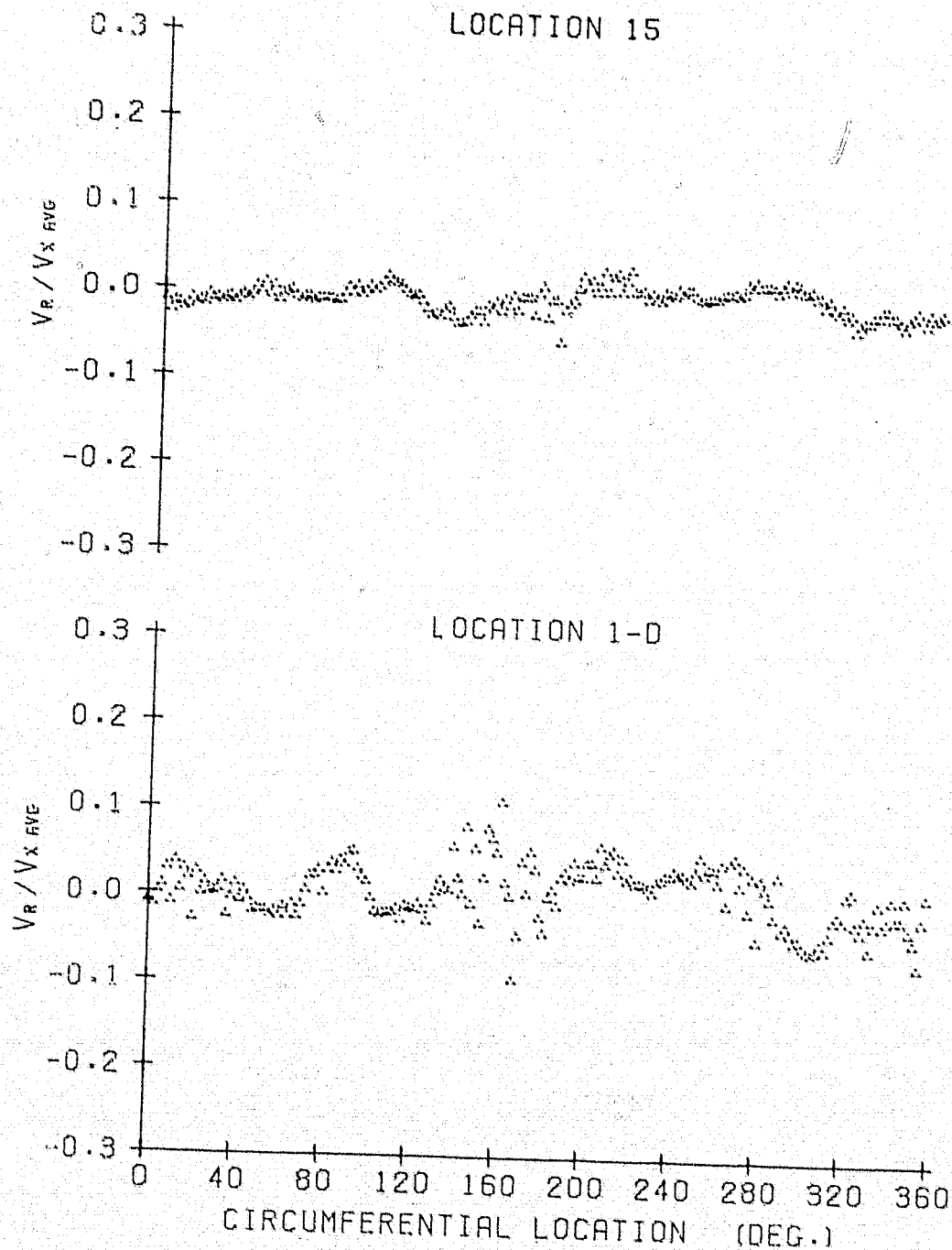


Figure F.9

10 October 1978
LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 993

AVG. FLOW COEF. = 0.963
AVG. P-RISE COEF. = 0.479
AVG. INCIDENCE = 11.07 DEG.

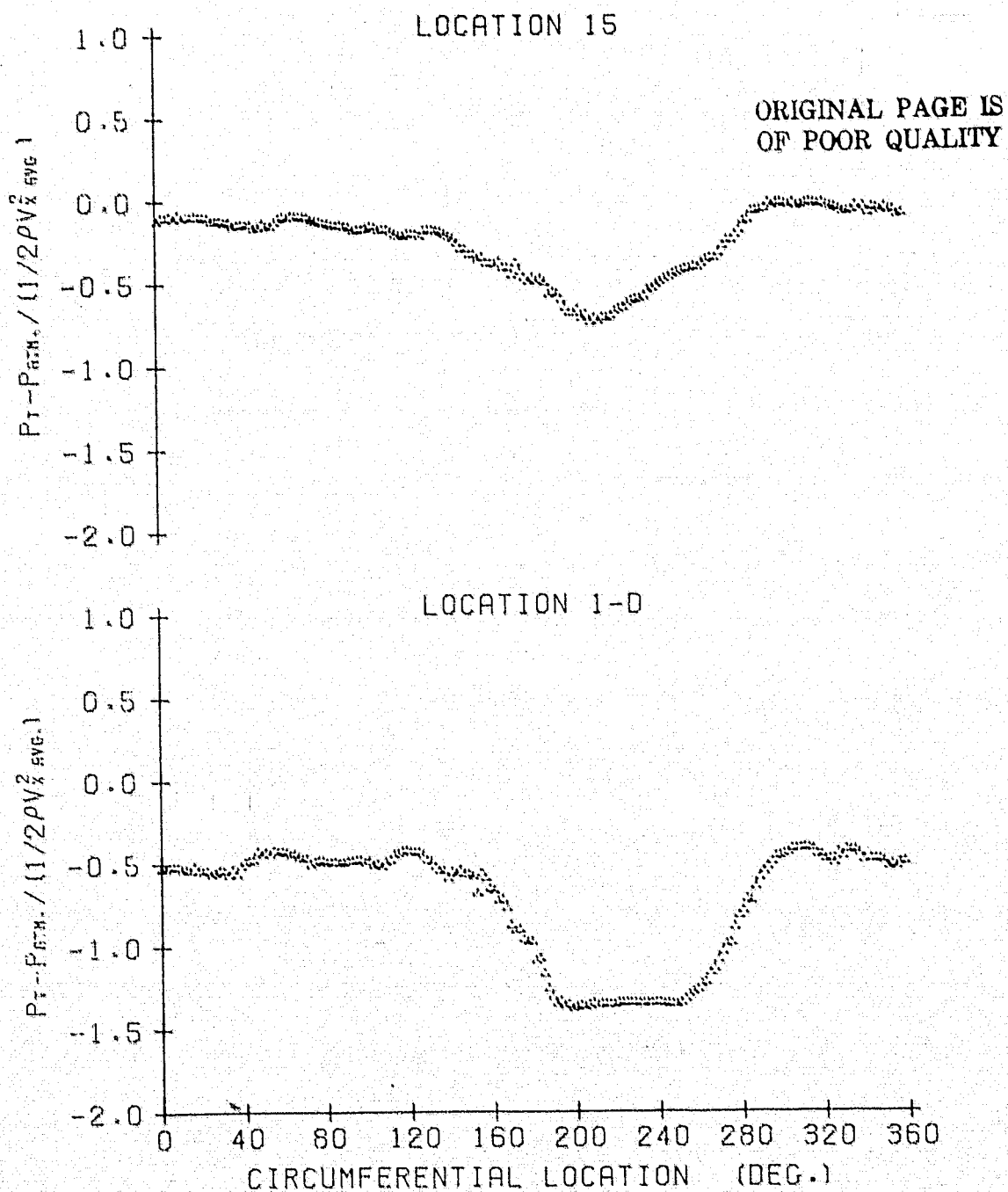


Figure F.10

10 October 1978
LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 993

AVG. FLOW COEF. = 0.963
AVG. P-RISE COEF. = 0.479
AVG. INCIDENCE = 11.07 DEG.

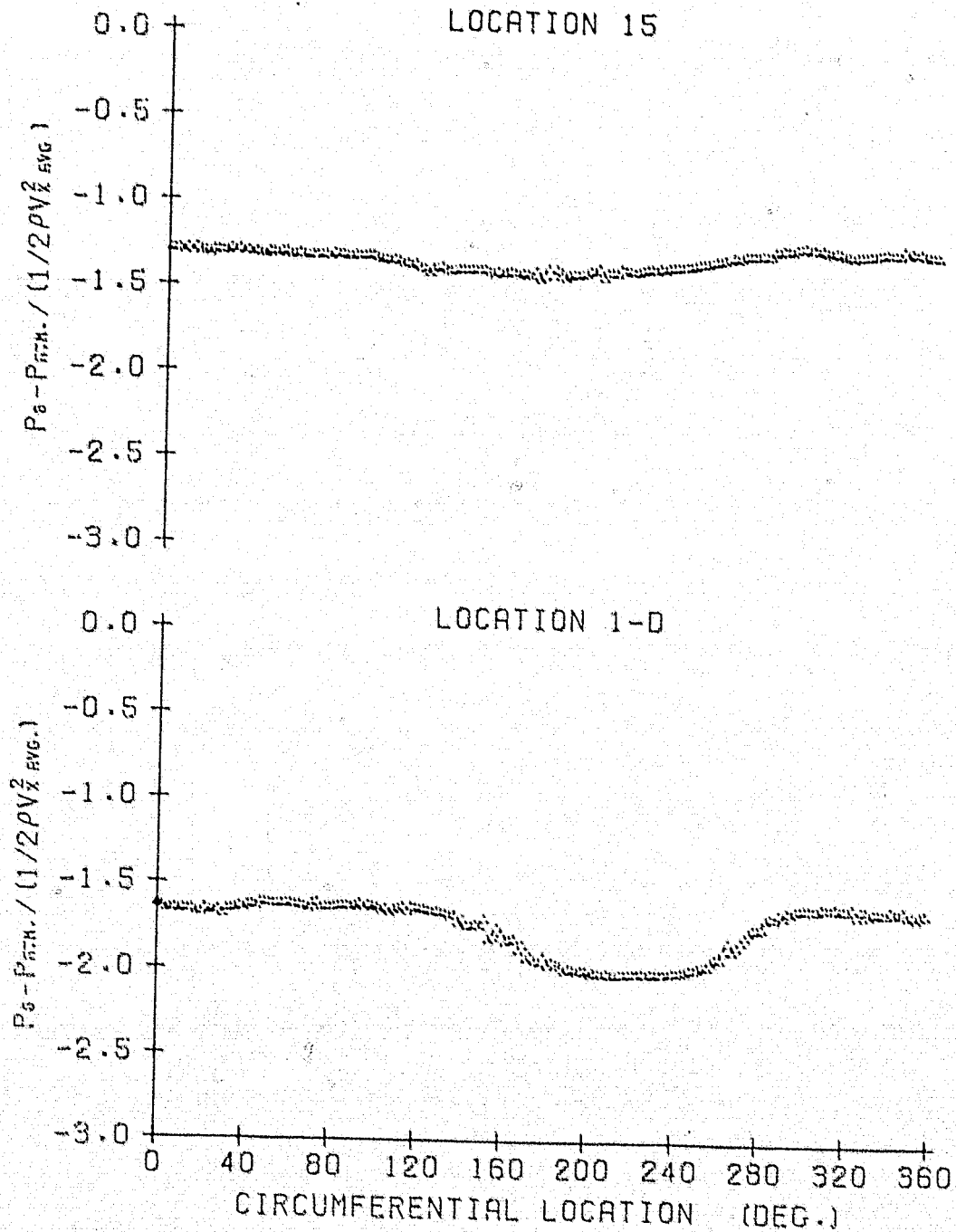


Figure F.11

10 October 1978

LCB:jep

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6 BLADES	AVG. FLOW COEF. = 0.963
35 DEG. STAGGER ANGLE	AVG. P-RISE COEF. = 0.479
90 DEG. SQ. DISTORTION	AVG. INCIDENCE = 11.07 DEG.
RPM = 993	

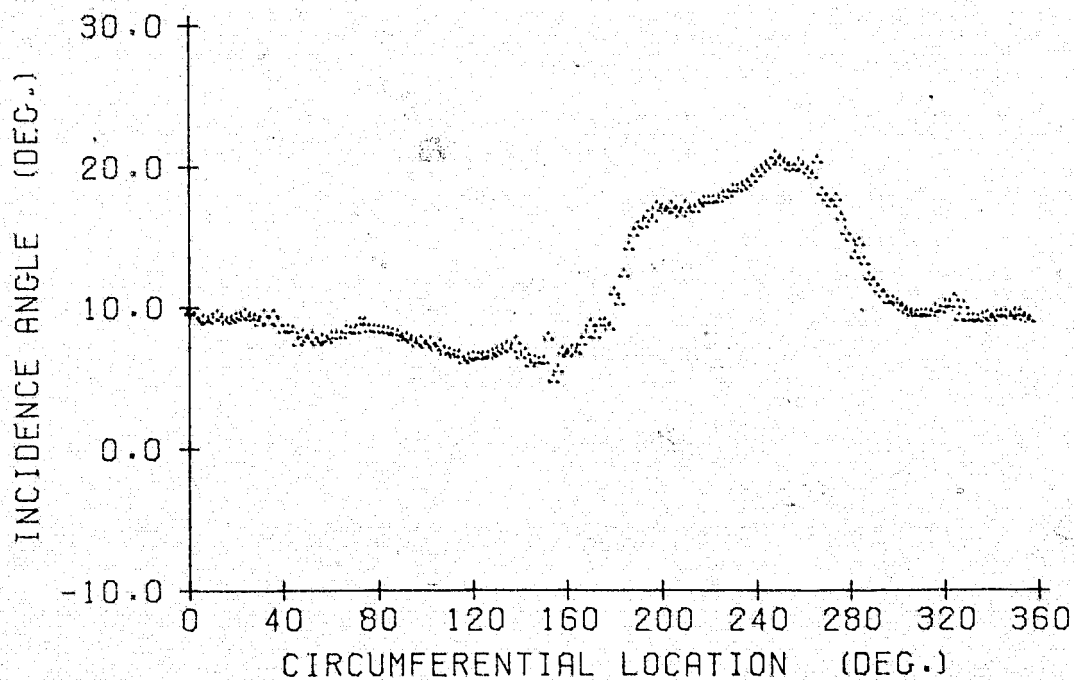


Figure F.12

10 October 1978
LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1143

AVG. FLOW COEF. = 0.817
AVG. P-RISE COEF. = 0.847
AVG. INCIDENCE = 15.75 DEG.

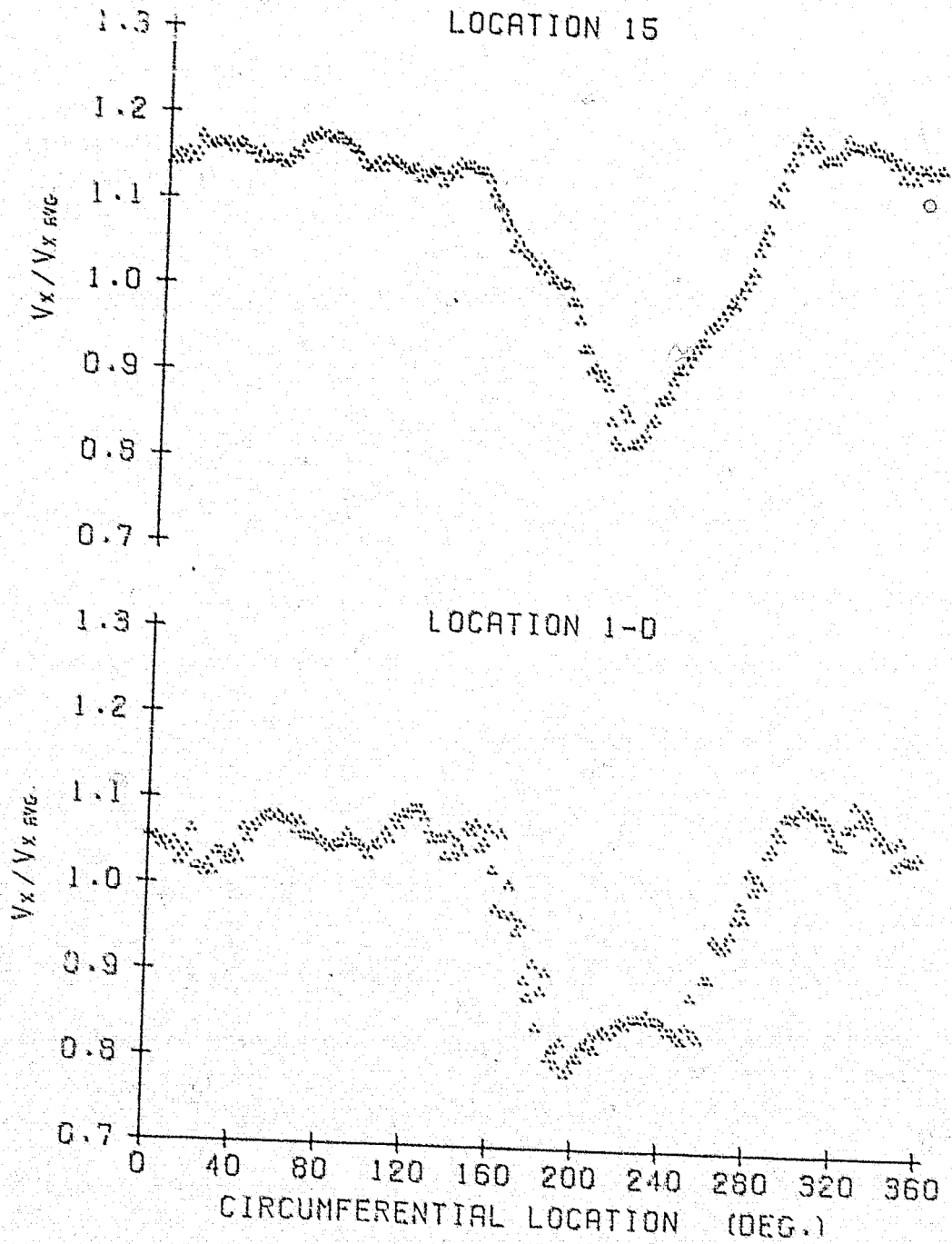


Figure F.13

10 October 1978

LCB:jep

6 BLADES

35 DEG. STAGGER ANGLE

90 DEG. SQ. DISTORTION

RPM = 1143

AVG. FLOW COEF. = 0.817

AVG. P-RISE COEF. = 0.847

AVG. INCIDENCE = 15.75 DEG.

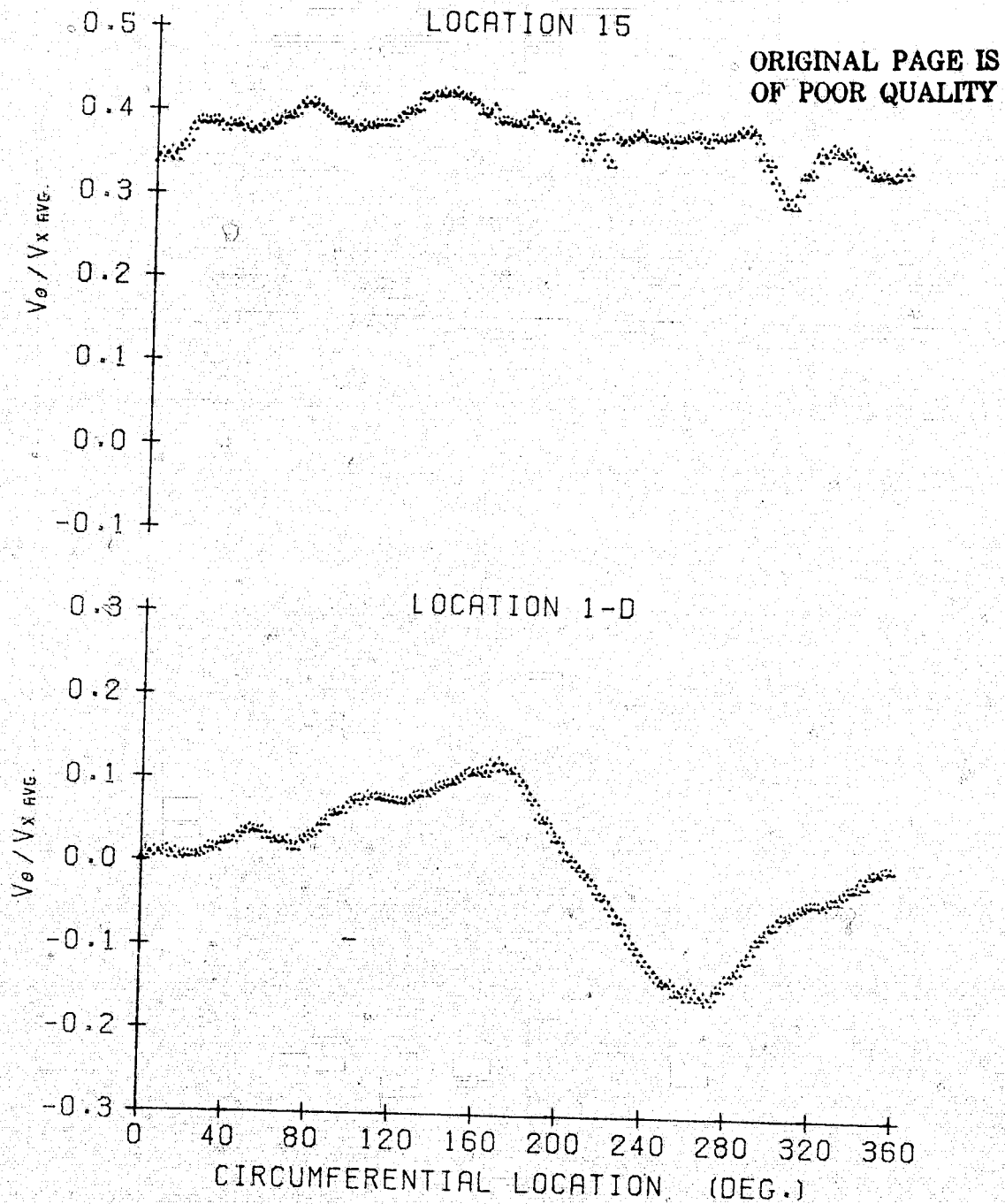


Figure F.14

10 October 1978

LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1143

AVG. FLOW COEF. = 0.817
AVG. P-RISE COEF. = 0.847
AVG. INCIDENCE = 15.75 DEG.

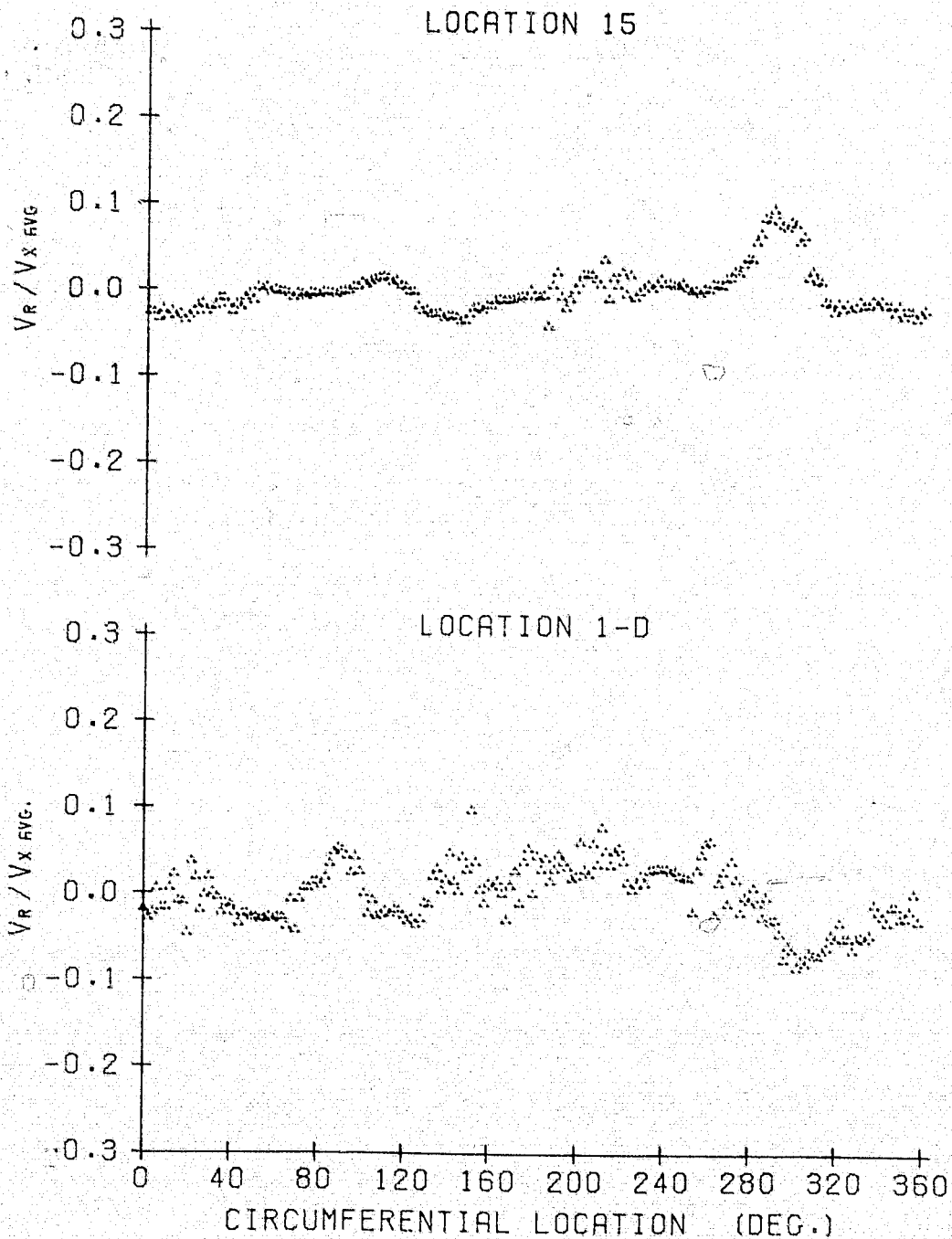


Figure F.15

10 October 1978

LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1143

AVG. FLOW COEF. = 0.817

AVG. P-RISE COEF. = 0.847

AVG. INCIDENCE = 15.75 DEG.

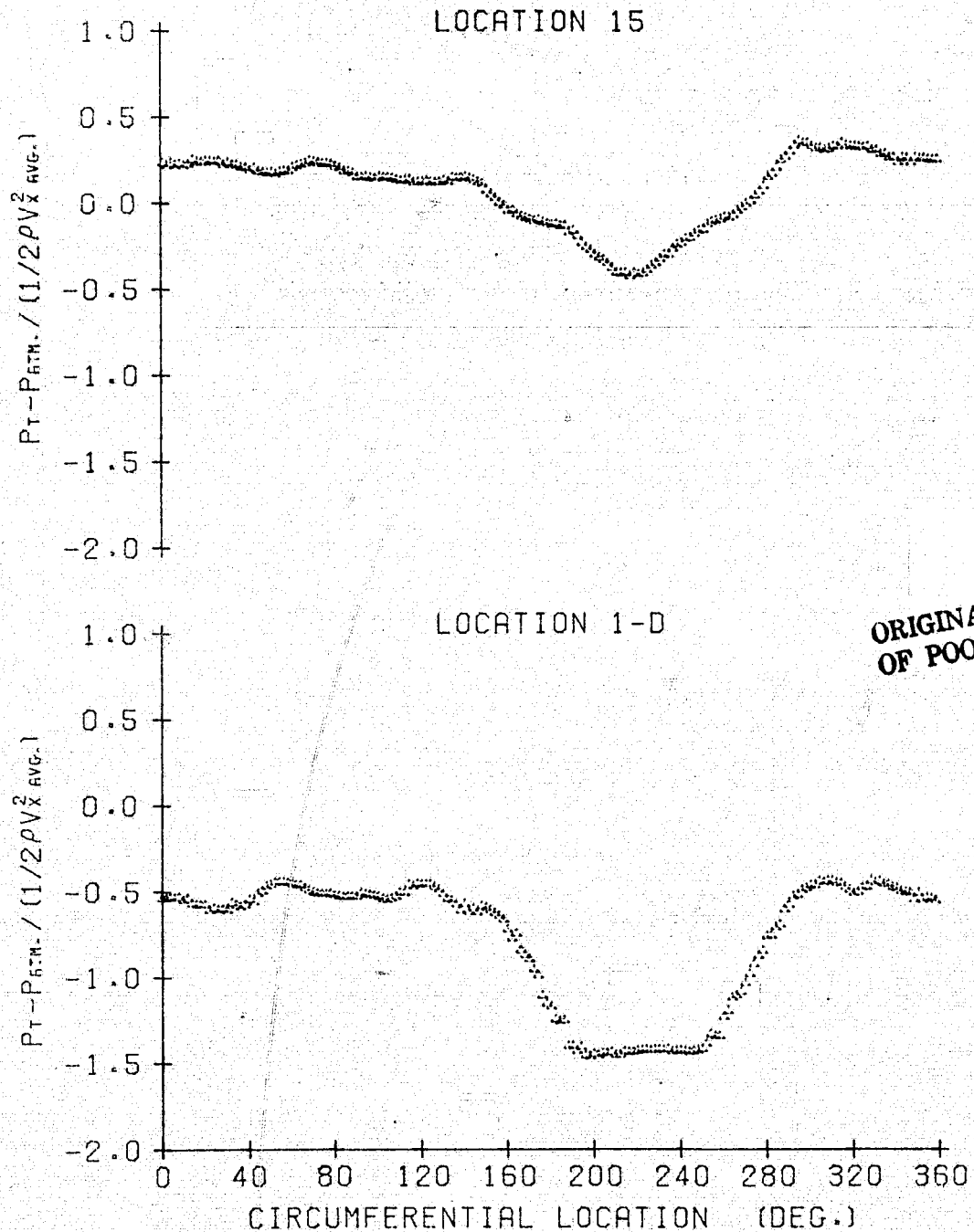


Figure F.16

10 October 1978
LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1143

AVG. FLOW COEF. = 0.817
AVG. P-RISE COEF. = 0.847
AVG. INCIDENCE = 15.75 DEG.

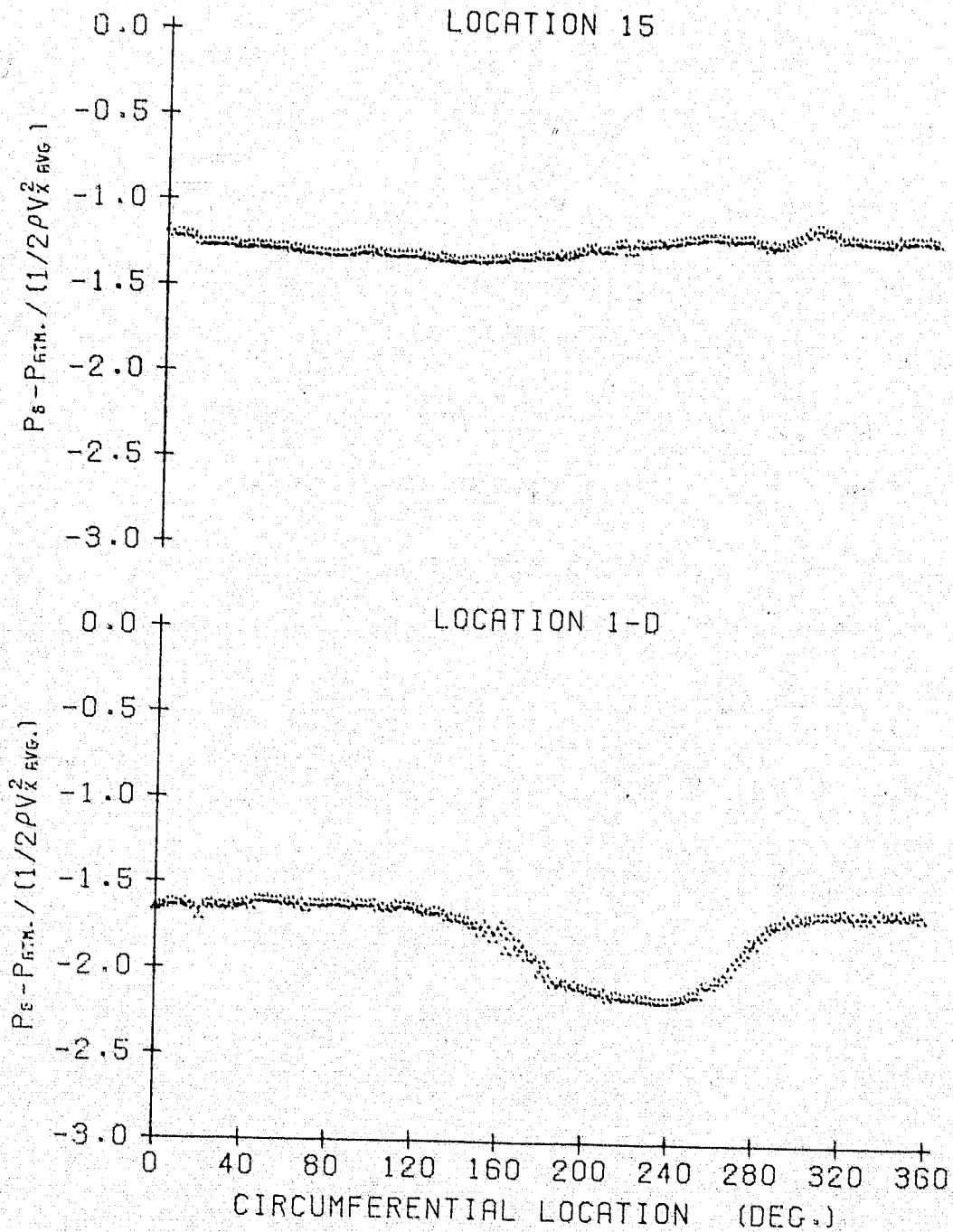


Figure F.17

10 October 1978
LCB:jep

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6 BLADES
35 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1143

AVG. FLOW COEF. = 0.817
AVG. P-RISE COEF. = 0.847
AVG. INCIDENCE = 15.75 DEG.

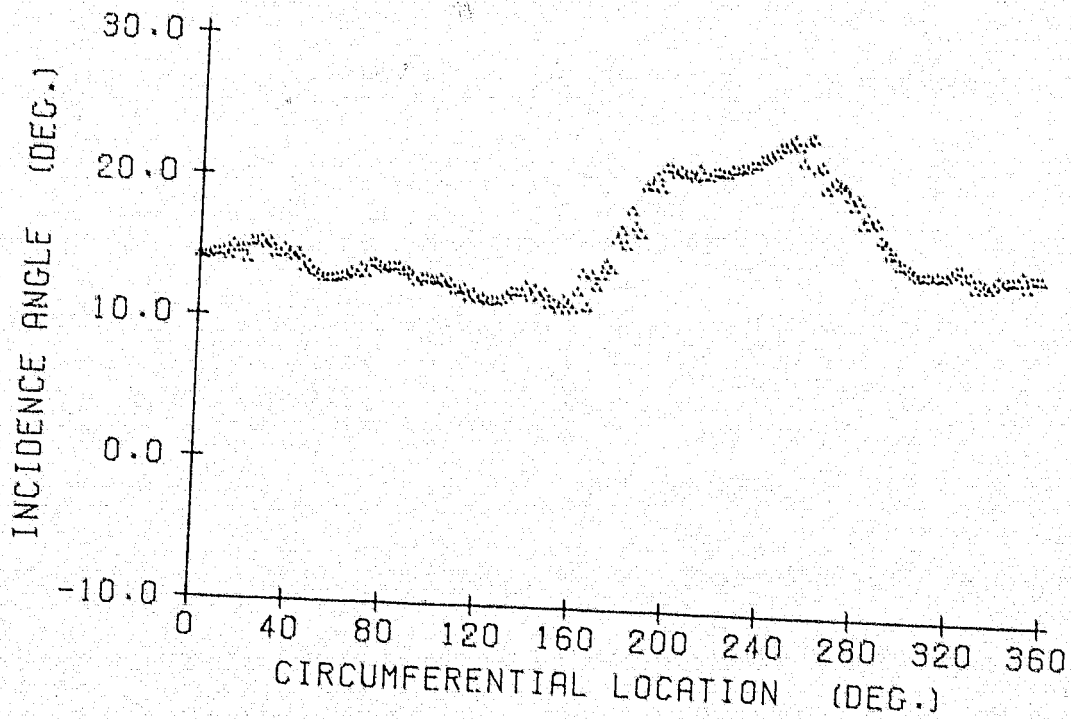


Figure F.18

10 October 1978
LCB:jep

6 BLADES
45 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 994

AVG. FLOW COEF. = 0.990
AVG. P-RISE COEF. = 0.027
AVG. INCIDENCE = 0.34 DEG.

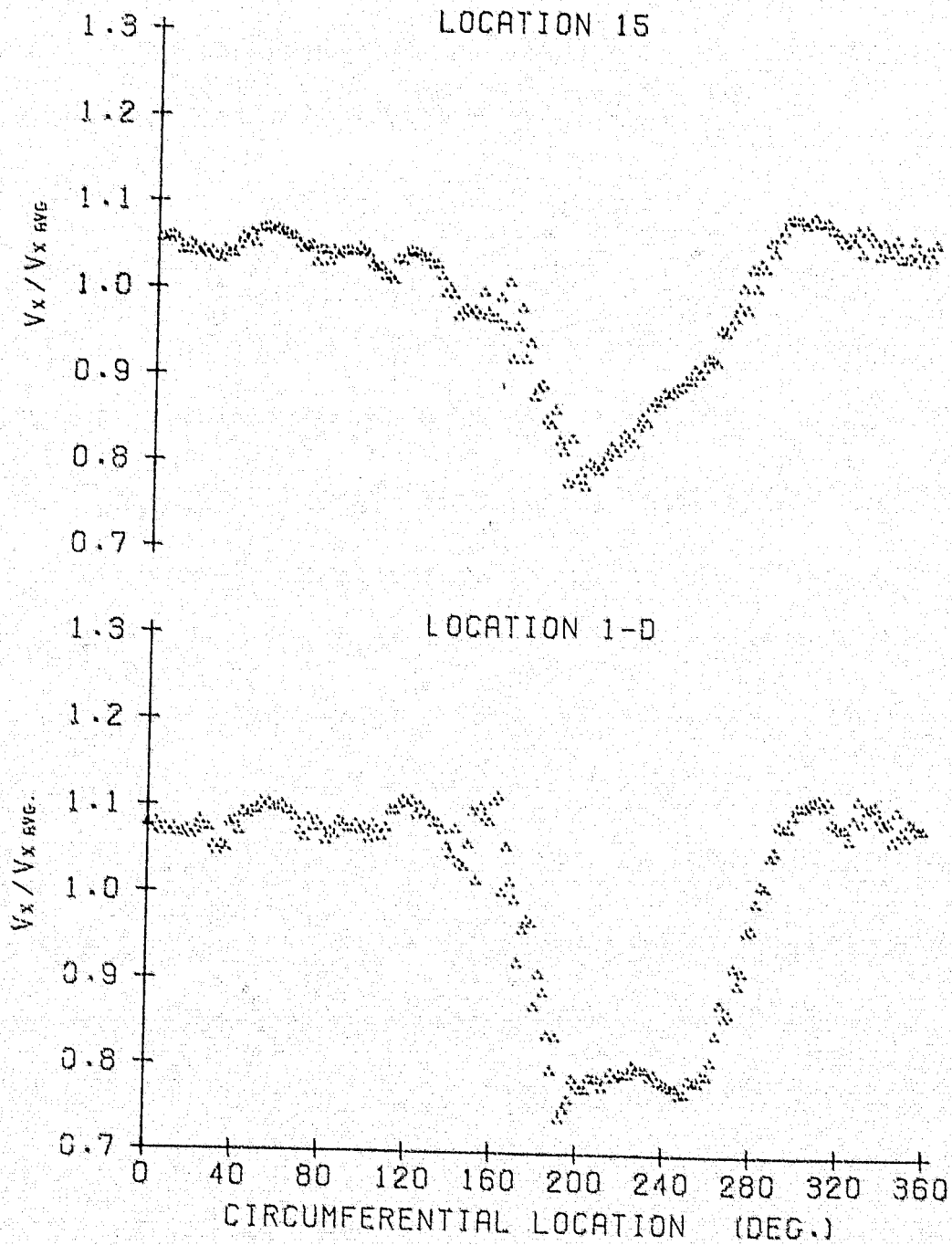


Figure F.19

10 October 1978

LCB:jep

6 BLADES
45 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 994

AVG. FLOW COEF. = 0.990
AVG. P-RISE COEF. = 0.027
AVG. INCIDENCE = 0.34 DEG.

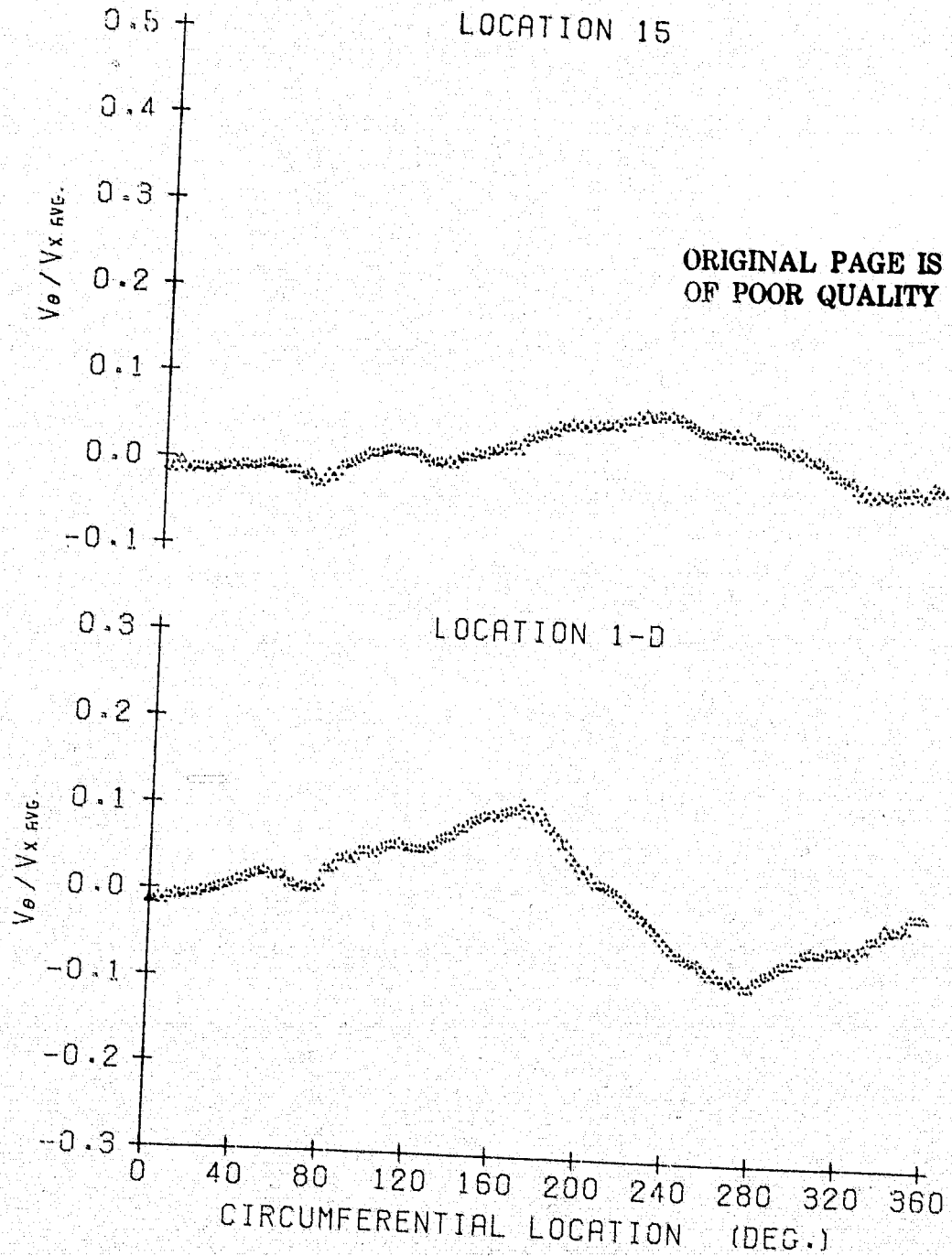


Figure F.20

10 October 1978

LGB:jep

6 BLADES
 15 DEG. STAGGER ANGLE
 90 DEG. SQ. DISTORTION
 RPM = 994

AVG. FLOW COEF. = 0.990

AVG. P-RISE COEF. = 0.027

AVG. INCIDENCE = 0.34 DEG.

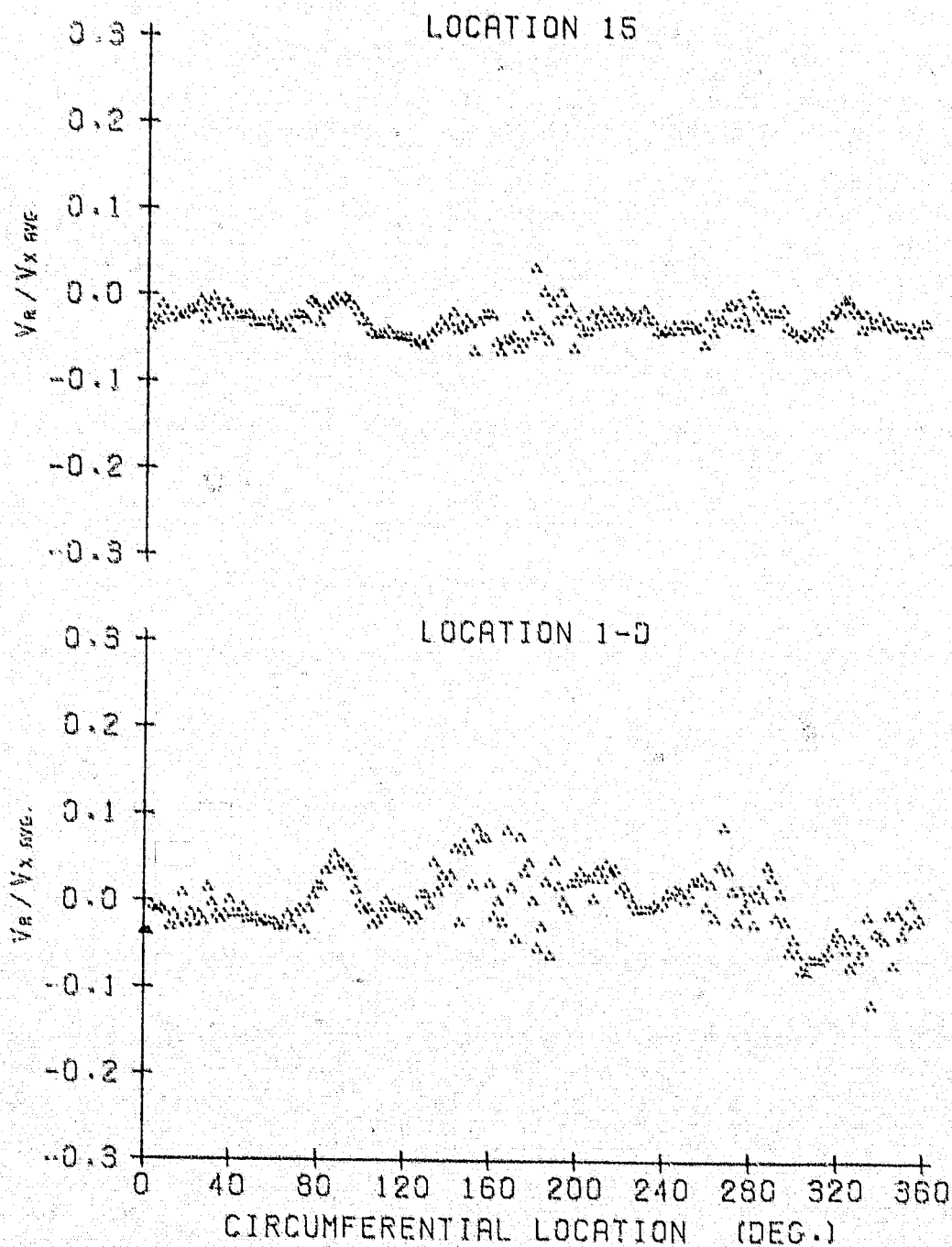


Figure F.21

10 October 1978
LCB:jep

6 BLADES
45 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 994

AVG. FLOW COEF. = 0.990
AVG. P-RISE COEF. = 0.027
AVG. INCIDENCE = 0.34 DEG.

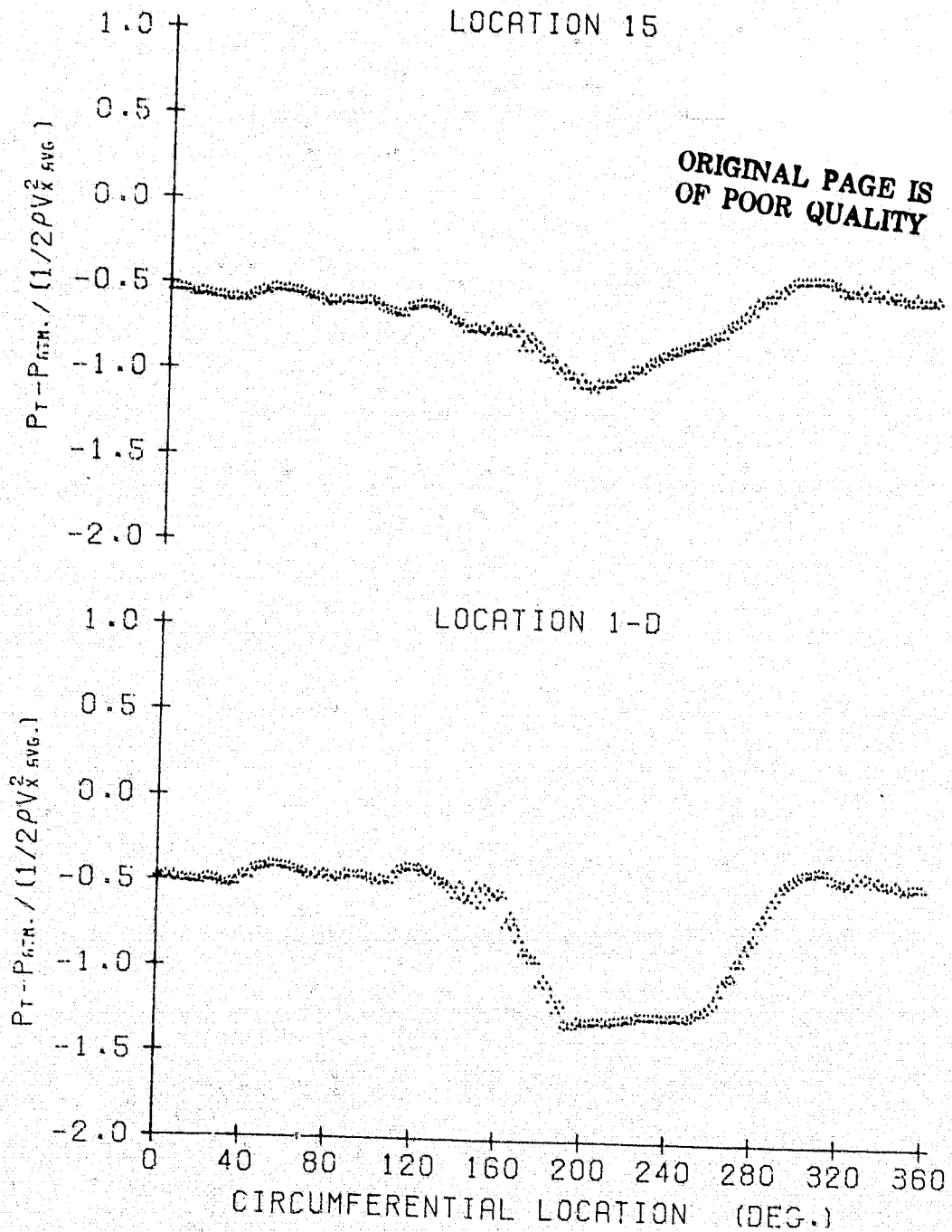


Figure F.22

10 October 1978
LCB:jep

6 BLADES
45 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 994

AVG. FLOW COEF. = 0.990
AVG. P-RISE COEF. = 0.027
AVG. INCIDENCE = 0.34 DEG.

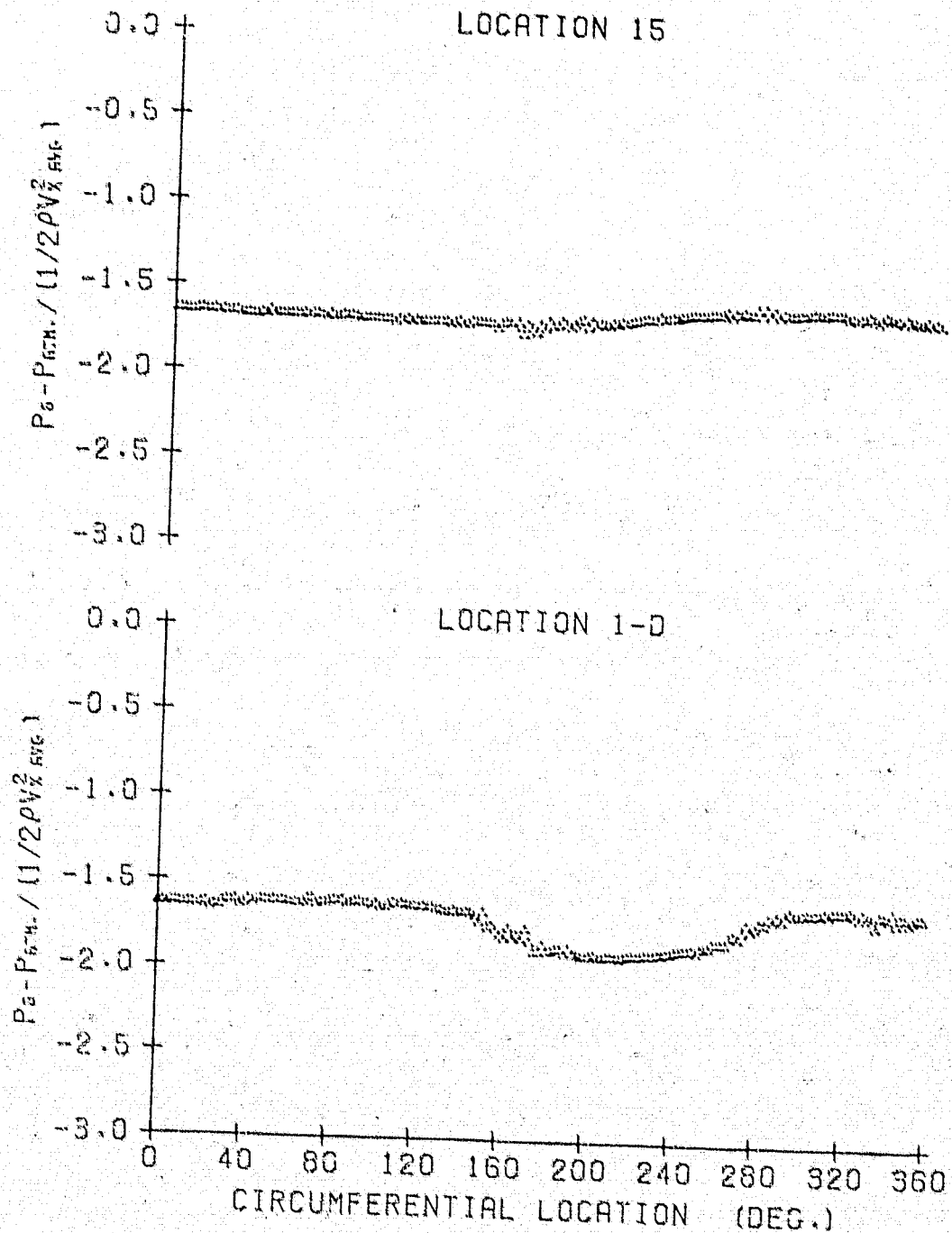


Figure F.23

10 October 1978
LCB:jep

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6 BLADES
45 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 994

AVG. FLOW COEF. = 0.993
AVG. P-RISE COEF. = 0.027
AVG. INCIDENCE = 0.34 DEG.

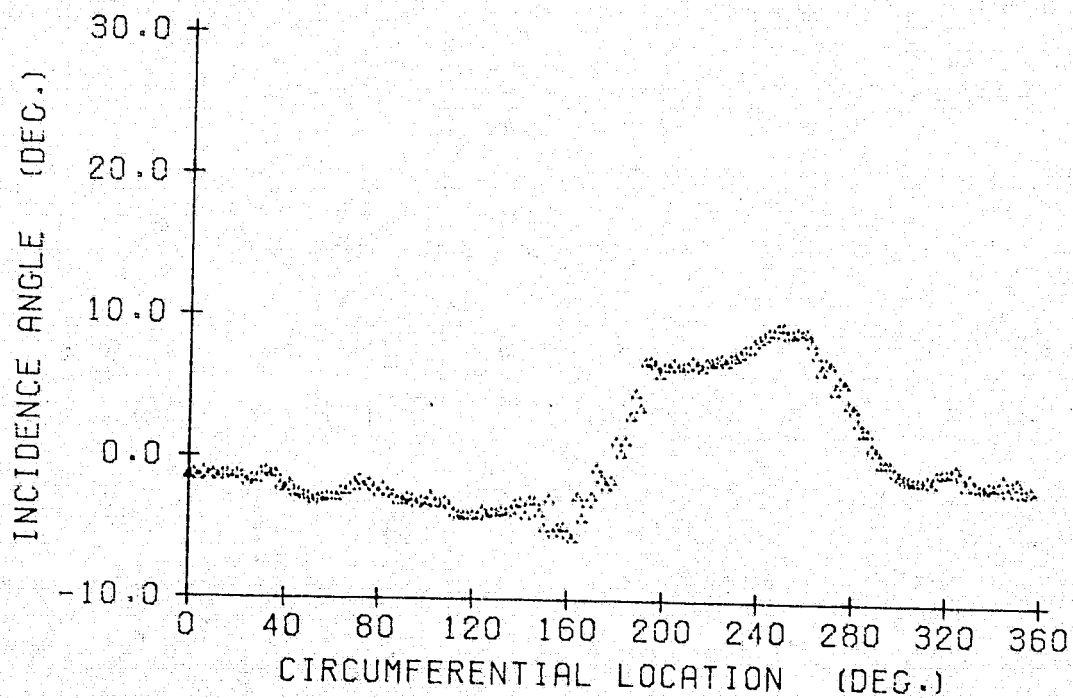


Figure F.24

10 October 1978
LCB:jep

6 BLADES
45 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1375

AVG. FLOW COEF. = 0.722
AVG. P-RISE COEF. = 0.800
AVG. INCIDENCE = 9.18 DEG.

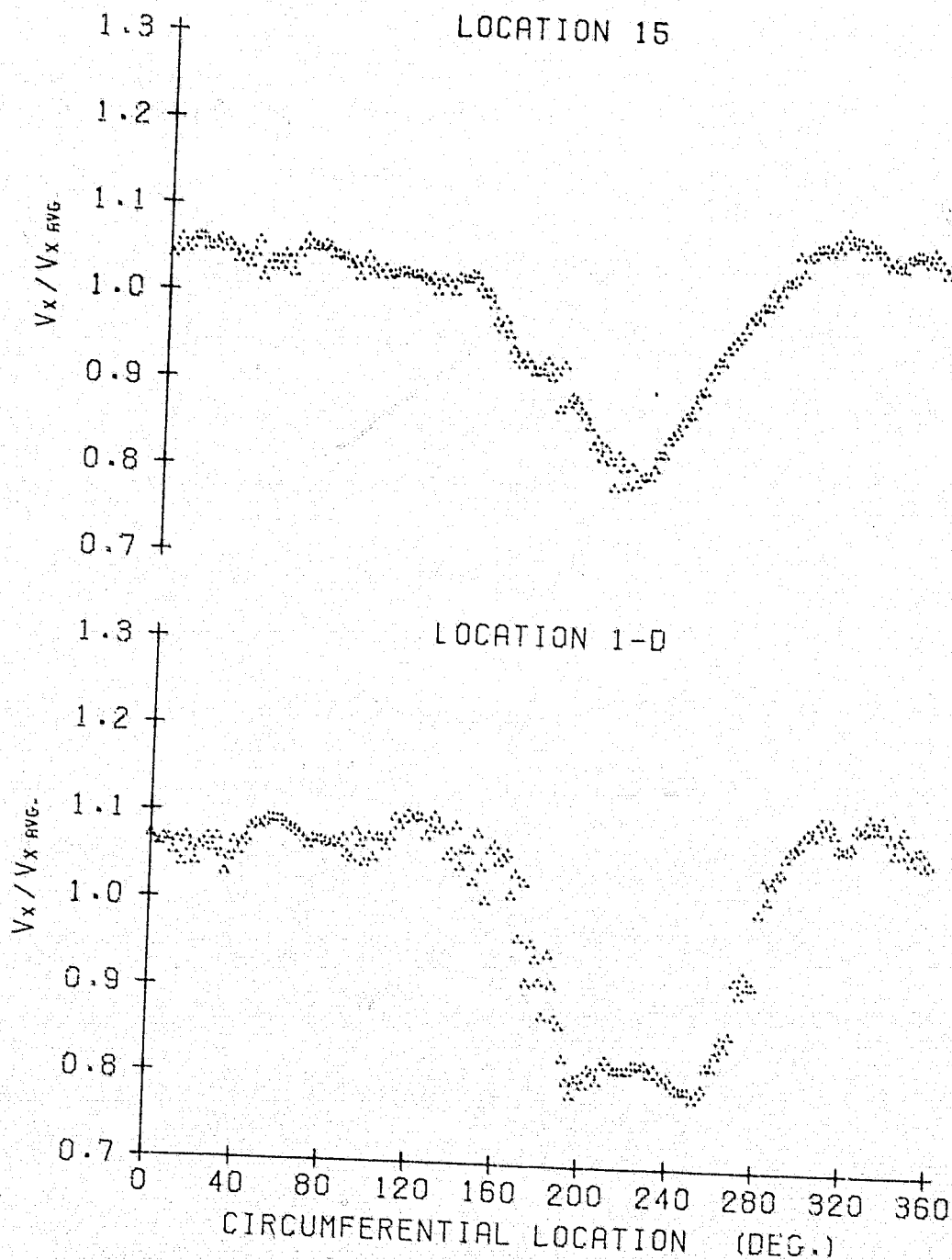


Figure F.25

6 BLADES

AVG. FLOW COEF. = 0.722

45 DEG. STAGGER ANGLE

AVG. P-RISE COEF. = 0.800

90 DEG. SQ. DISTORTION

AVG. INCIDENCE = 9.18 DEG.

RPM = 1375

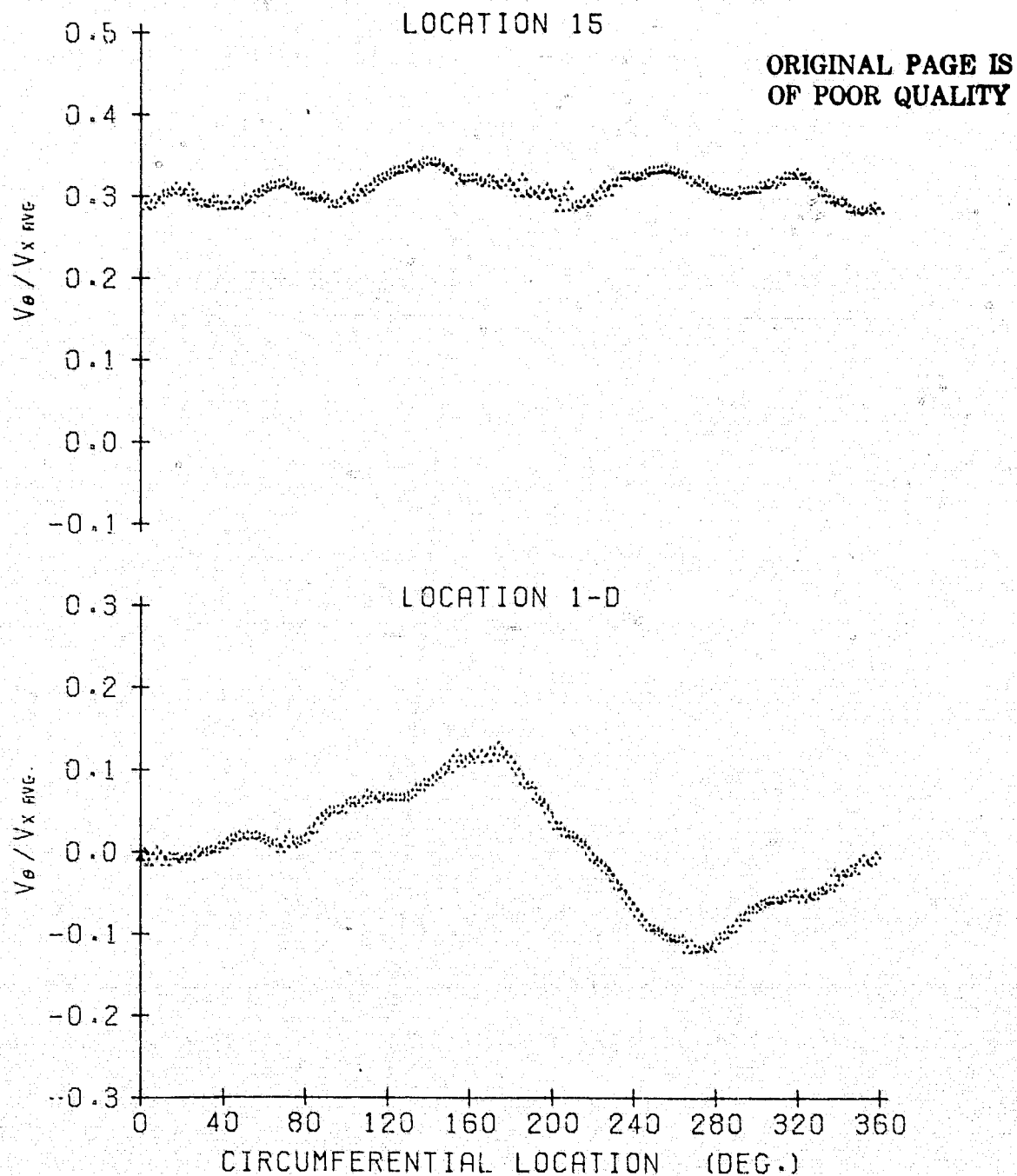


Figure F.26

10 October 1978
LCB:jep

6 BLADES
45 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1375

AVG. FLOW COEF. = 0.722
AVG. P-RISE COEF. = 0.800
AVG. INCIDENCE = 9.18 DEG.

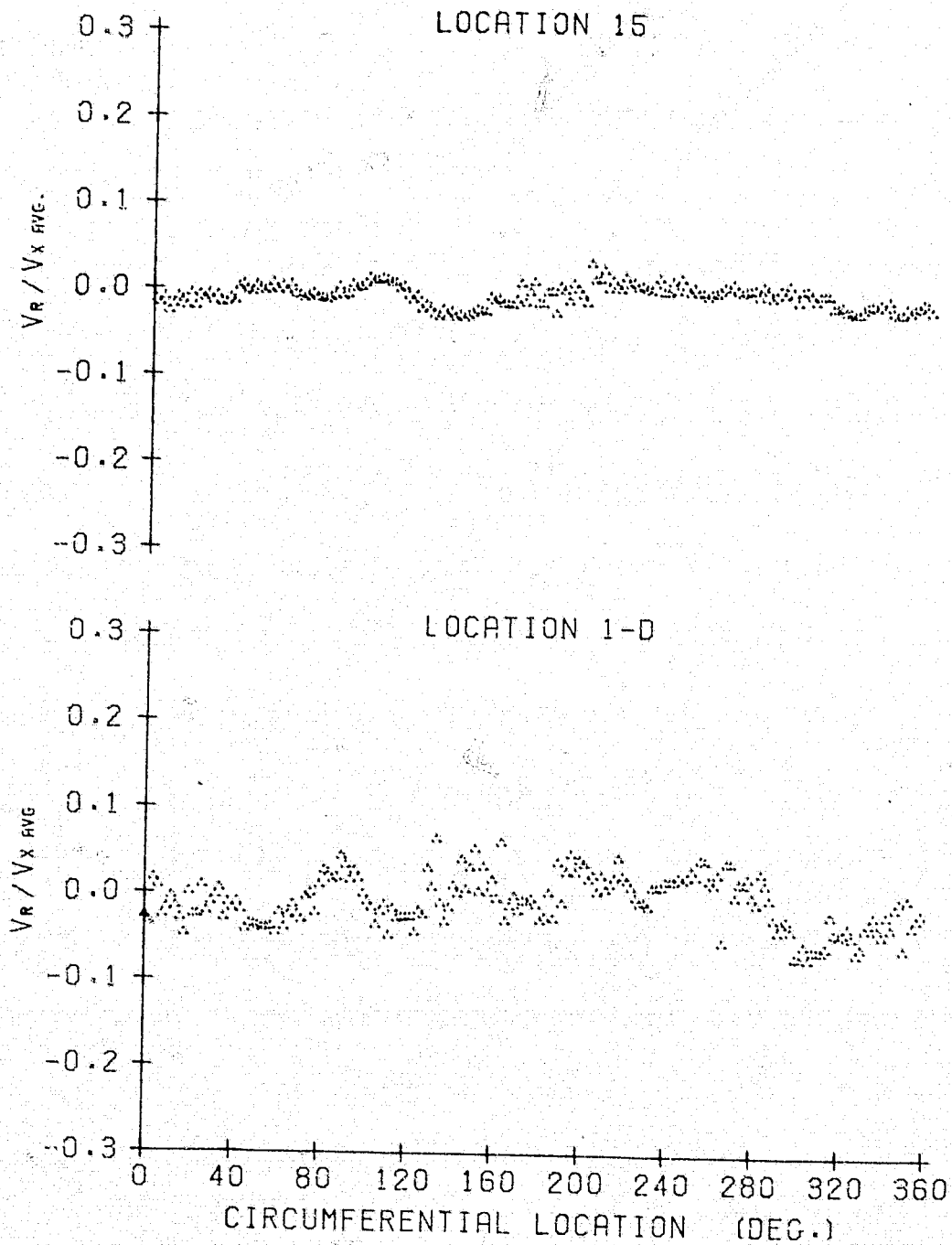


Figure F.27

10 October 1978
LCB:jep

6 BLADES

45 DEG. STAGGER ANGLE

90 DEG. SQ. DISTORTION

RPM = 1375

AVG. FLOW COEF. = 0.722

AVG. P-RISE COEF. = 0.800

AVG. INCIDENCE = 9.18 DEG.

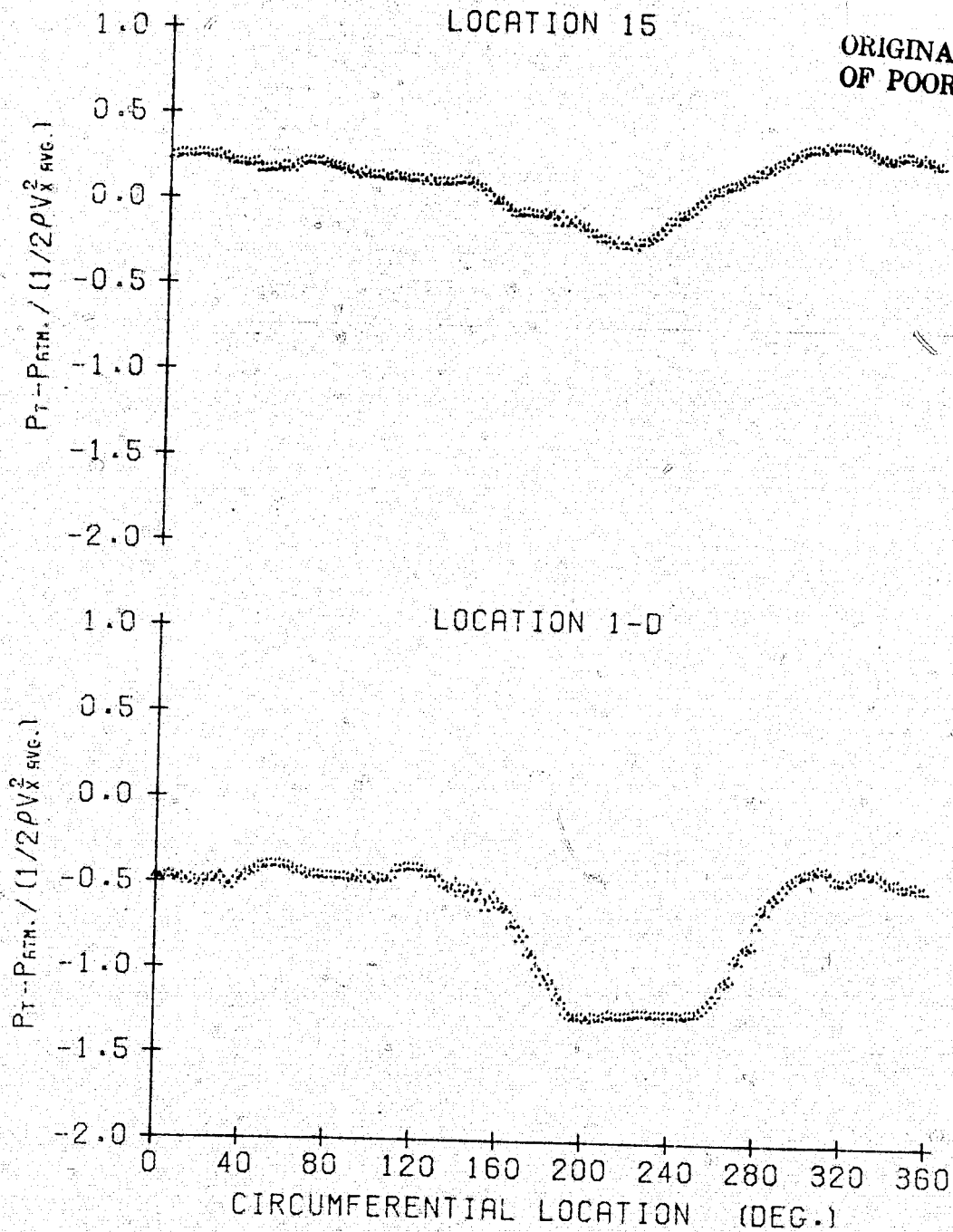


Figure F.28

-358-

10 October 1978
LCB:jep

6 BLADES
45 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1375

AVG. FLOW COEF. = 0.722
AVG. P-RISE COEF. = 0.800
AVG. INCIDENCE = 9.18 DEG.

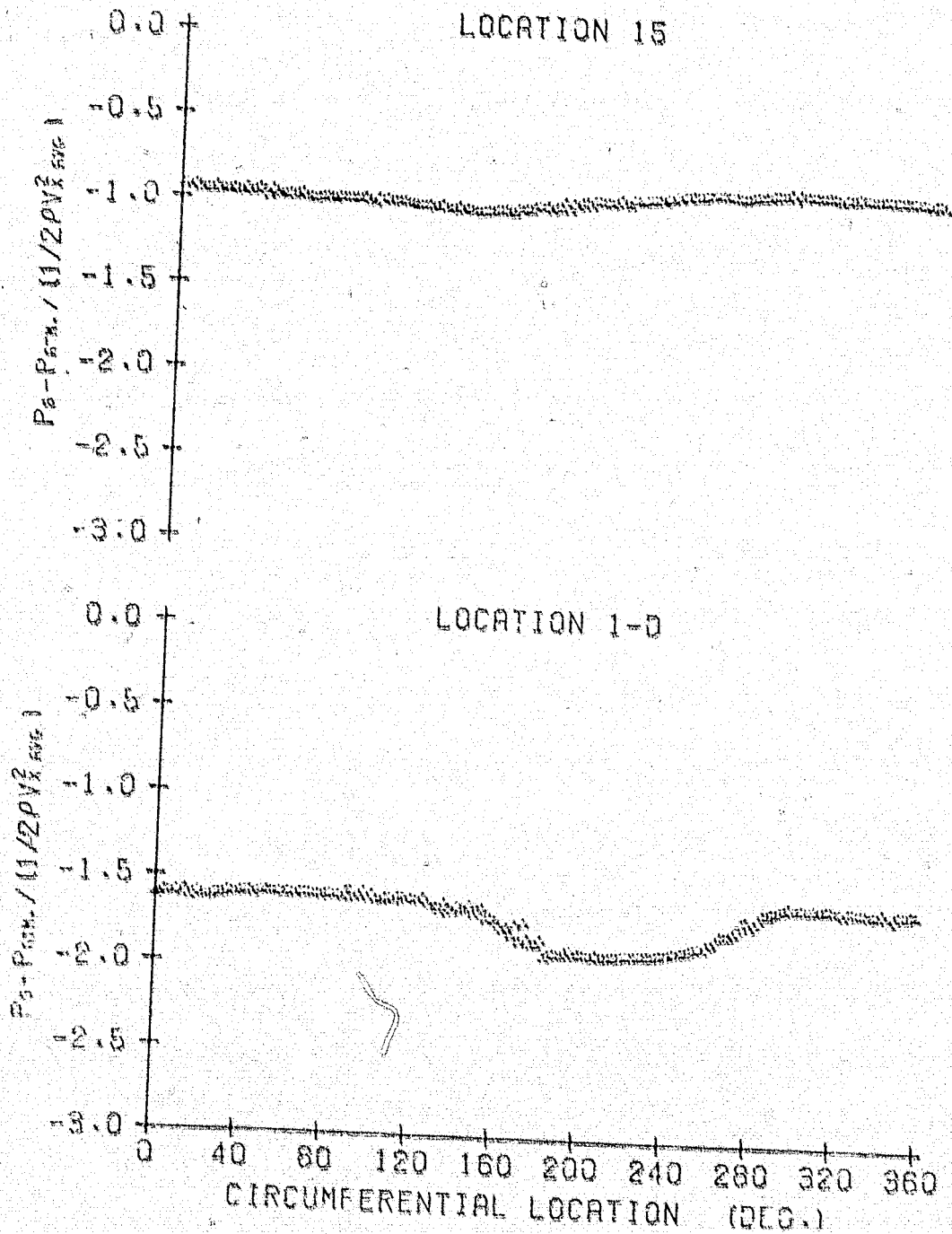


Figure F.29

10 October 1978
LCB:jep

6 BLADES
45 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1375

AVG. FLOW COEF. = 0.722
AVG. P-RISE COEF. = 0.800
AVG. INCIDENCE = 9.18 DEG.

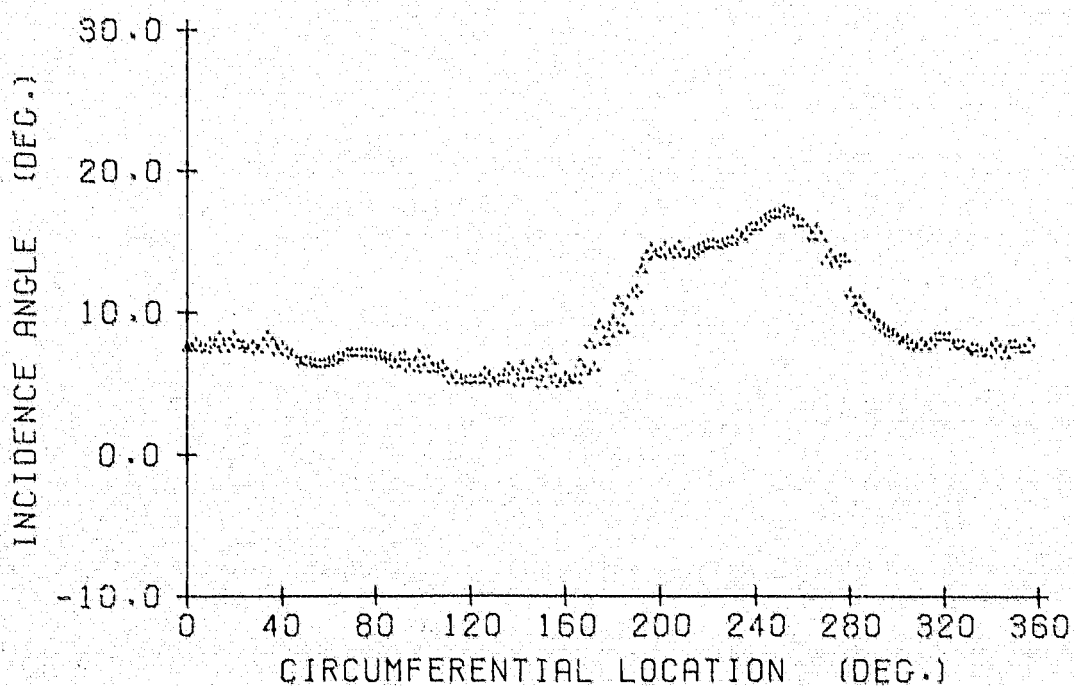


Figure F.30

10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1419

AVG. FLOW COEF. = 0.615
AVG. P-RISE COEF. = 0.145
AVG. INCIDENCE = 3.02 DEG.

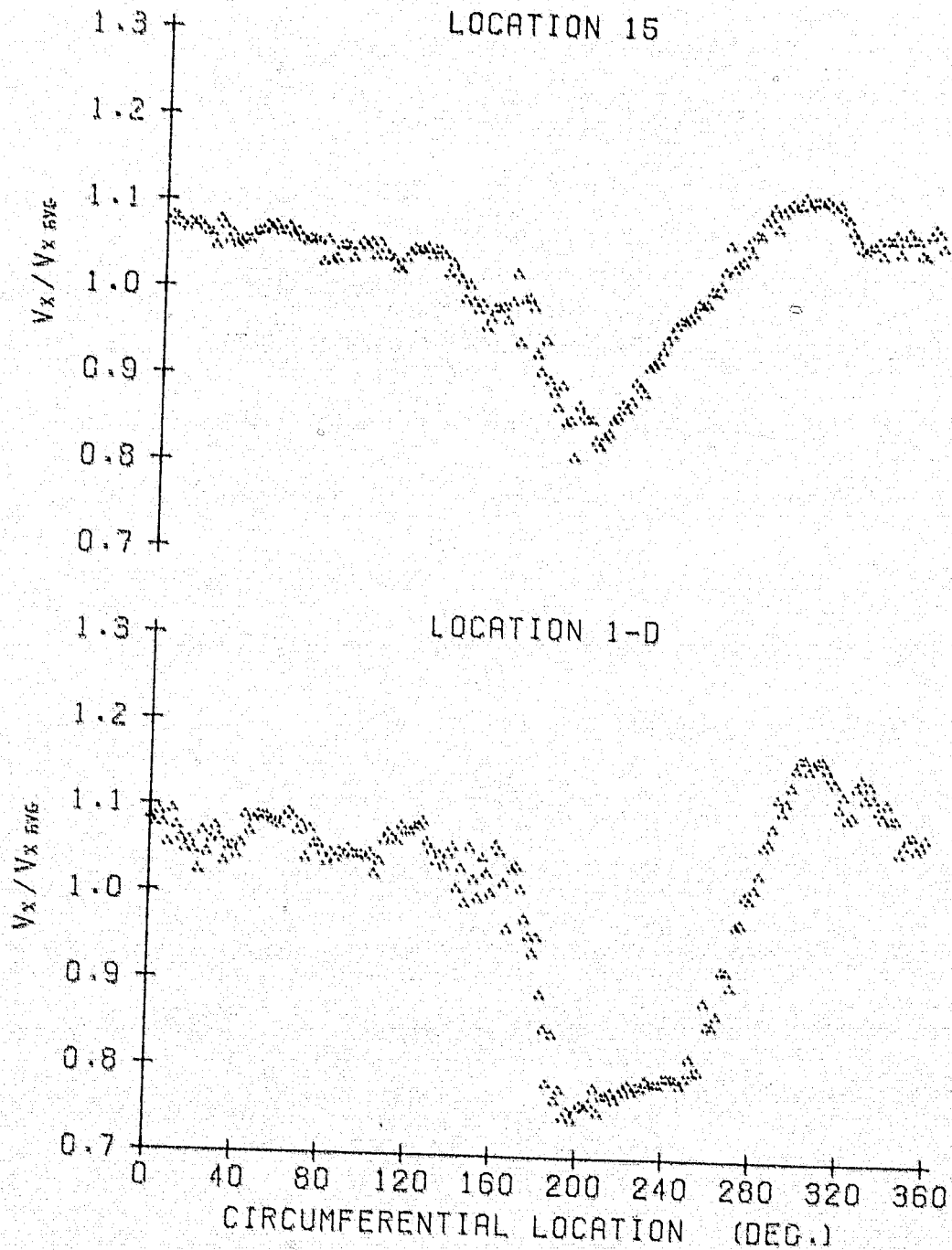


Figure F.31

10 October 1978

LCB:jep

6 BLADES

55 DEG. STAGGER ANGLE

90 DEG. SQ. DISTORTION

RPM = 1419

AVG. FLOW COEF. = 0.615

AVG. P-RISE COEF. = 0.145

AVG. INCIDENCE = 3.02 DEG.

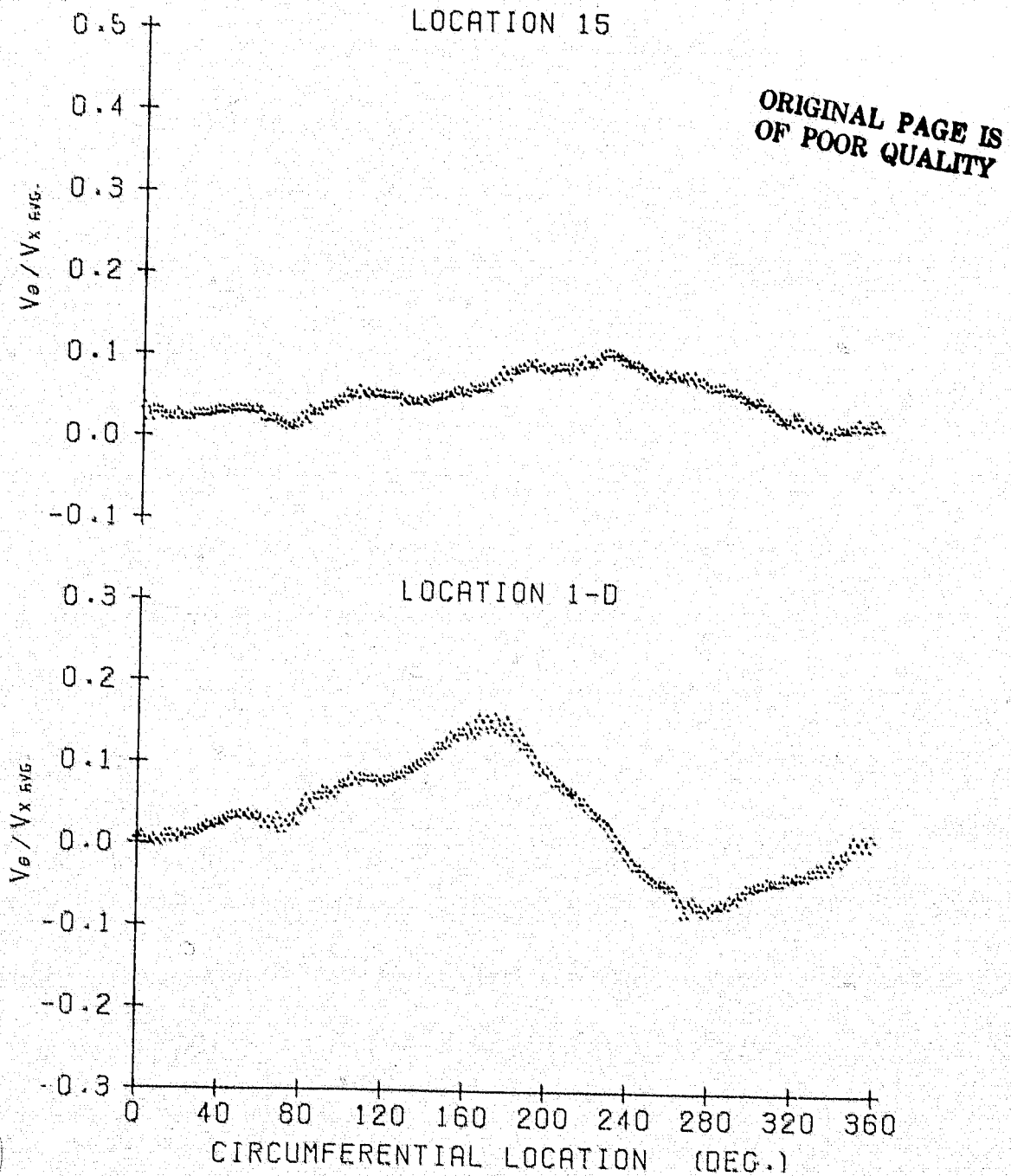


Figure F.32

10 October 1978
LGB:jep

6 BLADES
55 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM : 1419

AVG. FLOW COEF. = 0.615
AVG. P-RISE COEF. = 0.145
AVG. INCIDENCE = 3.02 DEG.

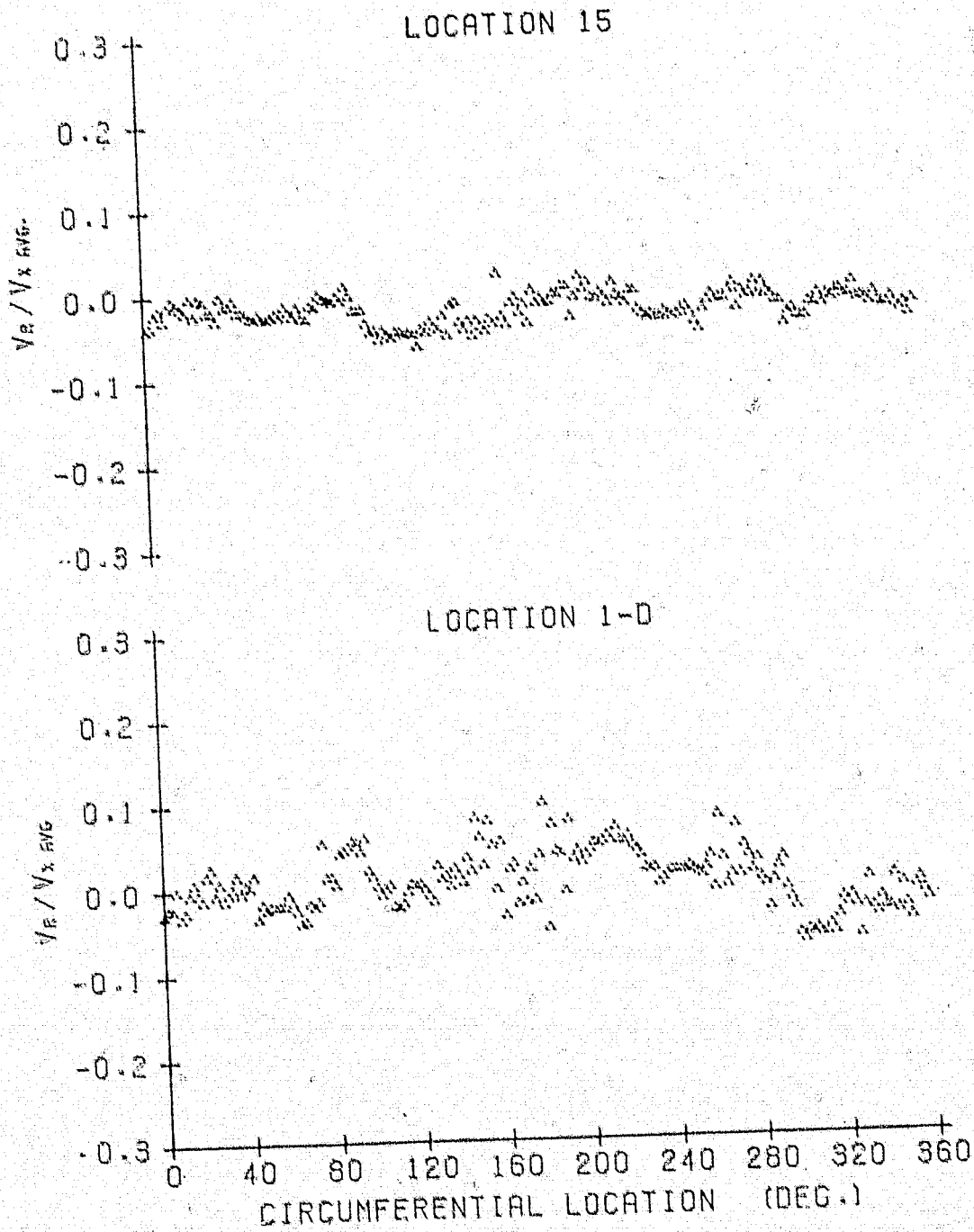


Figure F.33

10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1419

AVG. FLOW COEF. = 0.615
AVG. P-RISE COEF. = 0.145
AVG. INCIDENCE = 3.02 DEG.

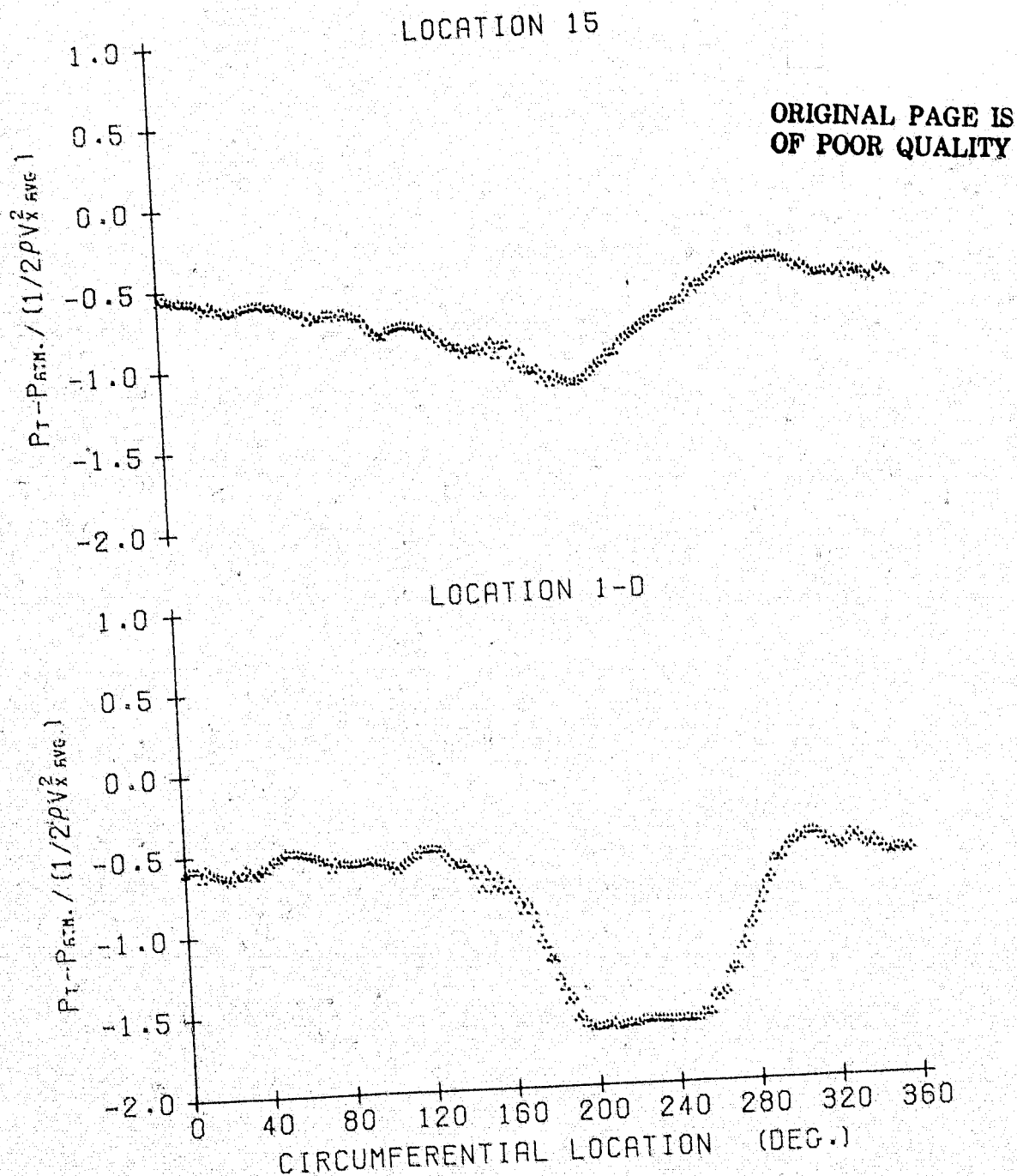


Figure F.34

10 October 1978

LCB:jep

6 BLADES
 55 DEG. STAGGER ANGLE
 90 DEG. SQ. DISTORTION
 RPM = 1419

AVG. FLOW COEF. = 0.615
 AVG. P-RISE COEF. = 0.145
 AVG. INCIDENCE = 3.02 DEG.

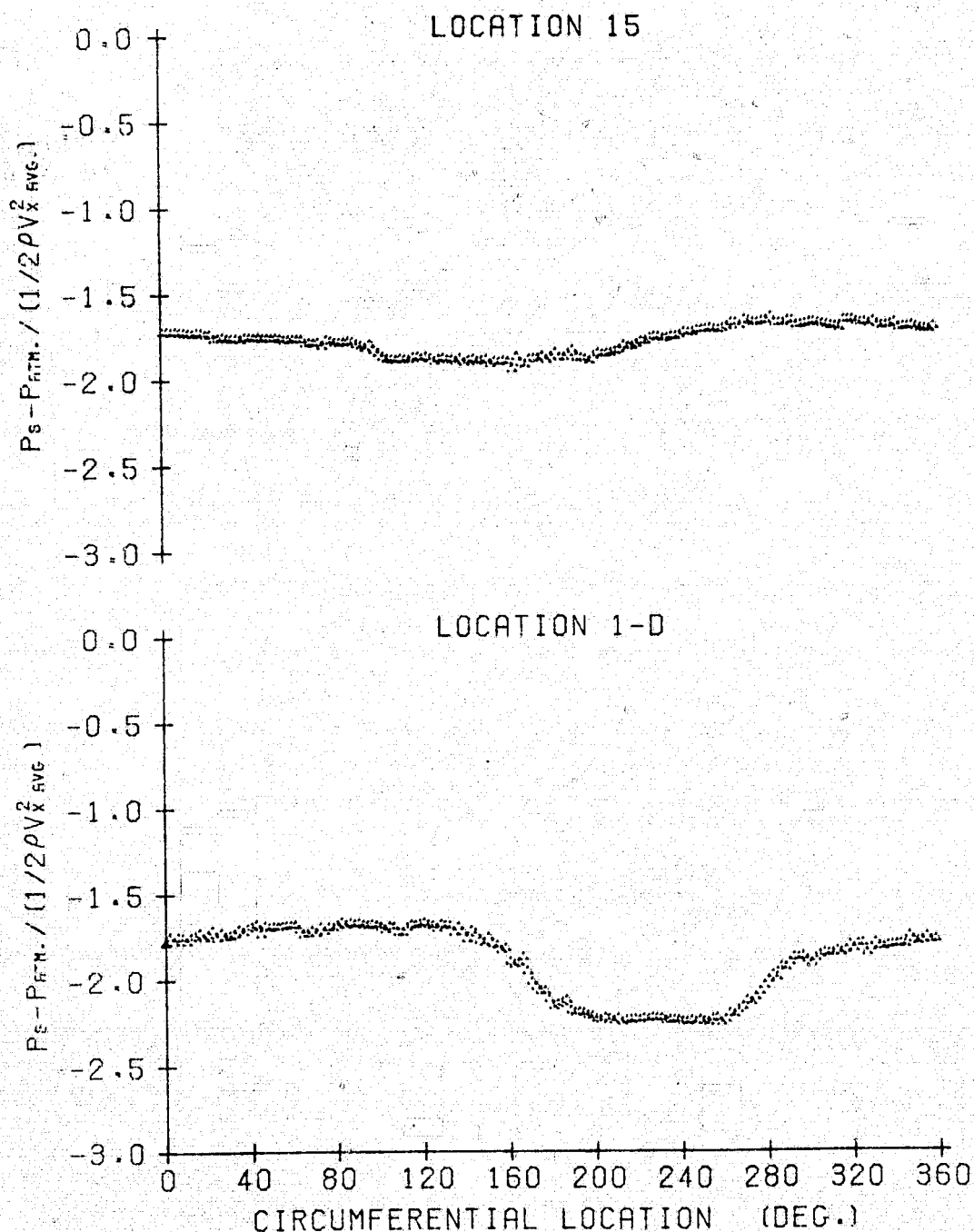


Figure F.35

10 October 1978
LCB:jep

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6 BLADES
55 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1419

AVG. FLOW COEF. = 0.615
AVG. P-RISE COEF. = 0.145
AVG. INCIDENCE = 3.02 DEG.

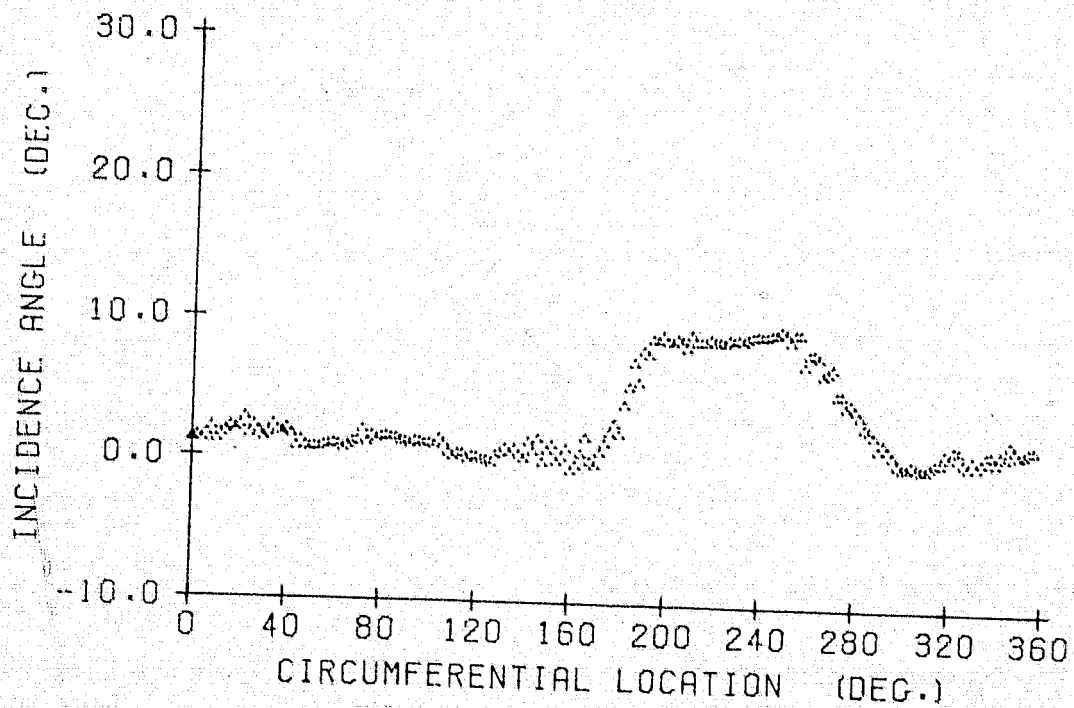


Figure F.36

10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1653

AVG. FLOW COEF. = 0.552
AVG. P-RISE COEF. = 0.785
AVG. INCIDENCE = 5.57 DEG.

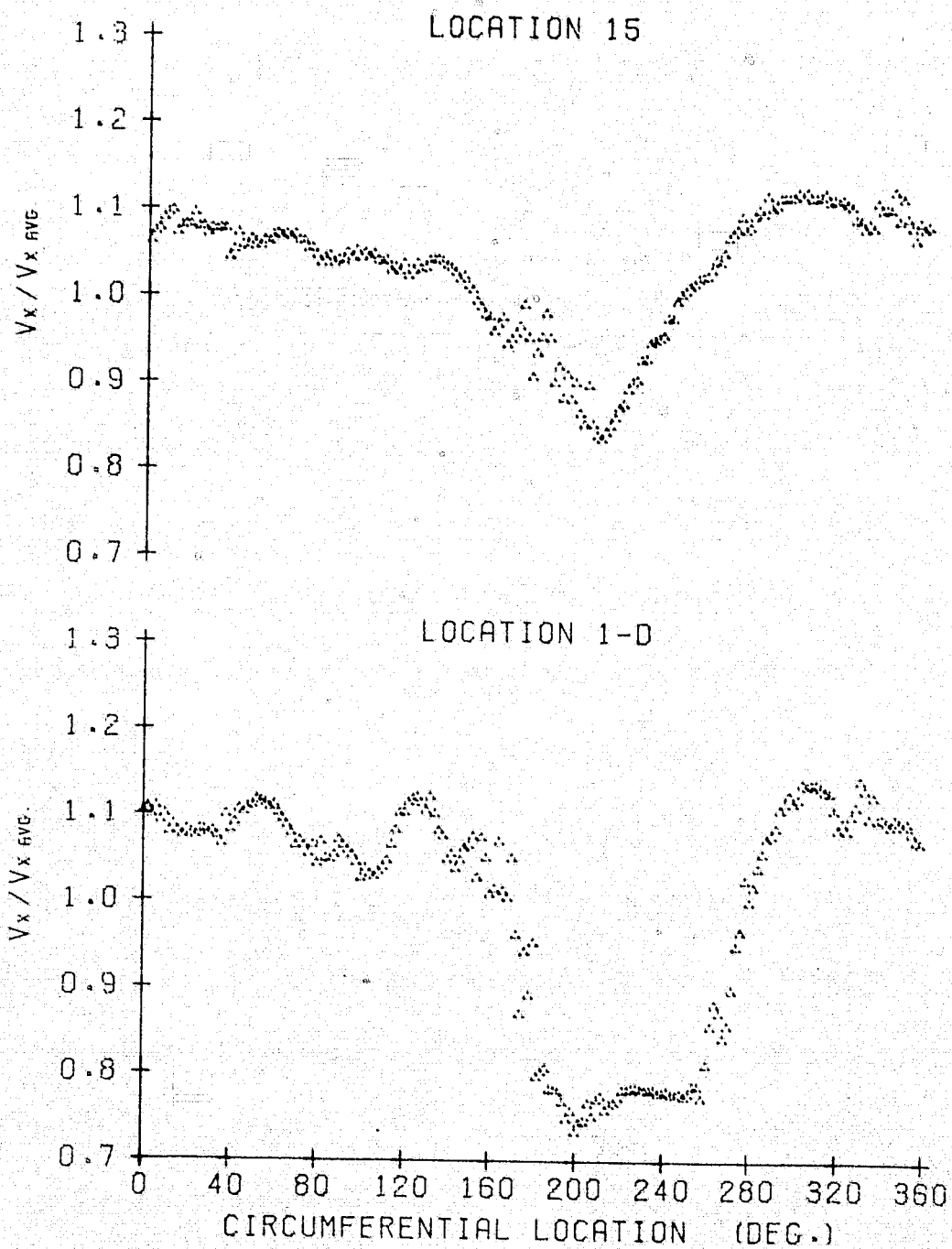


Figure F.37

10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1653

AVG. FLOW COEF. = 0.552
AVG. P-RISE COEF. = 0.785
AVG. INCIDENCE = 5.57 DEG.

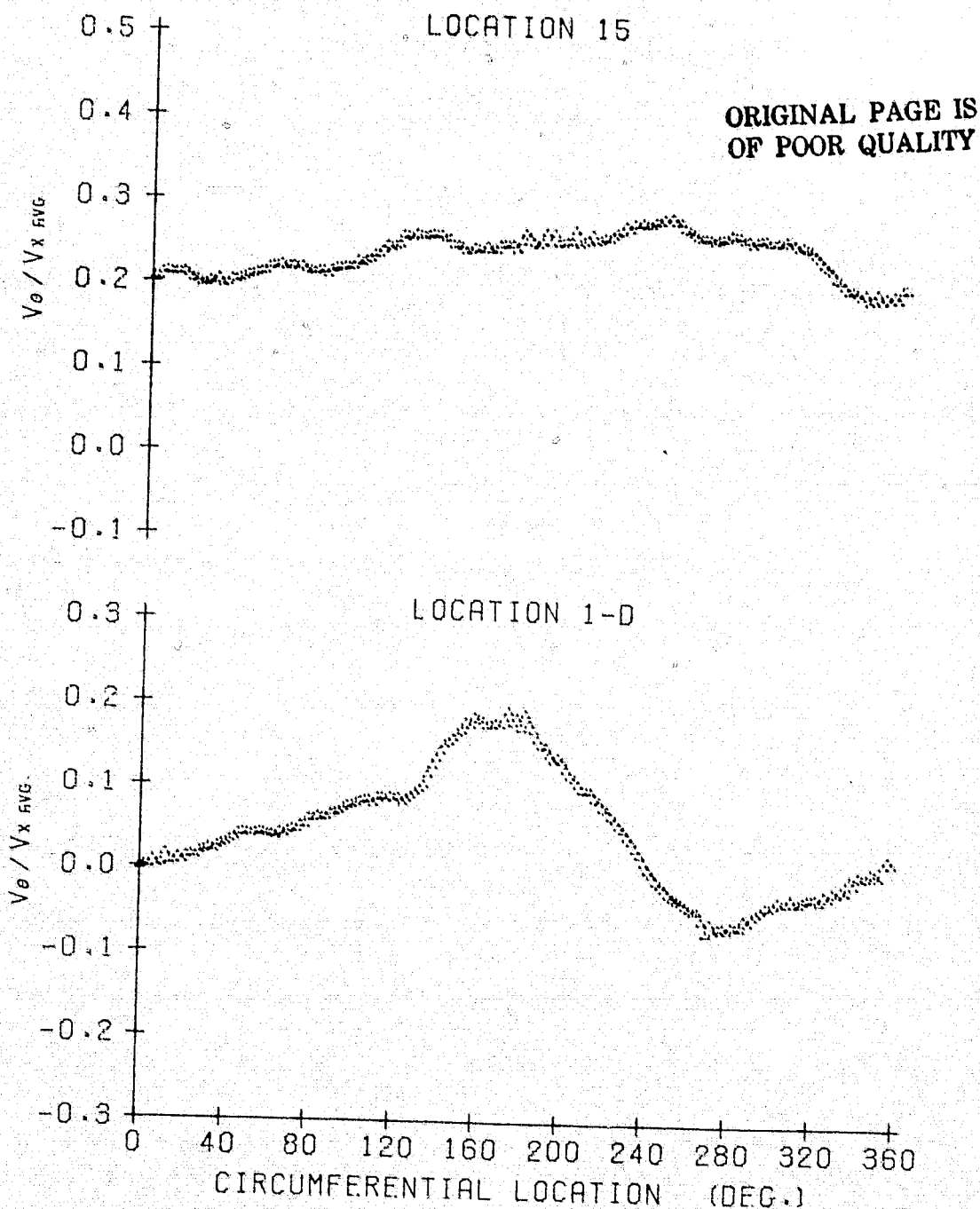


Figure F.38

10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1653

AVG. FLOW COEF. = 0.552
AVG. P-RISE COEF. = 0.785
AVG. INCIDENCE = 5.57 DEG.

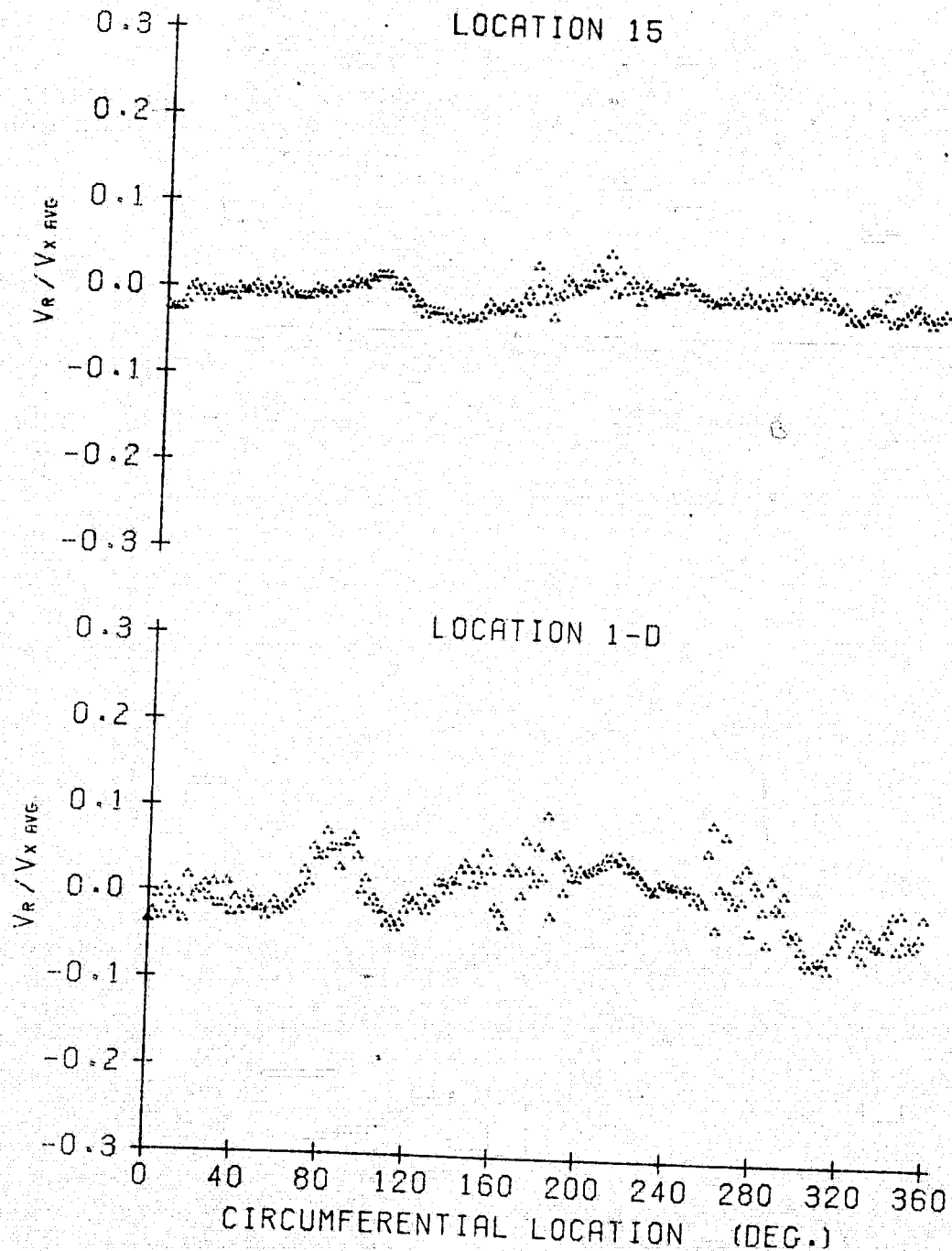


Figure F.39

10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1653

AVG. FLOW COEF. = 0.552
AVG. P-RISE COEF. = 0.785
AVG. INCIDENCE = 5.57 DEG.

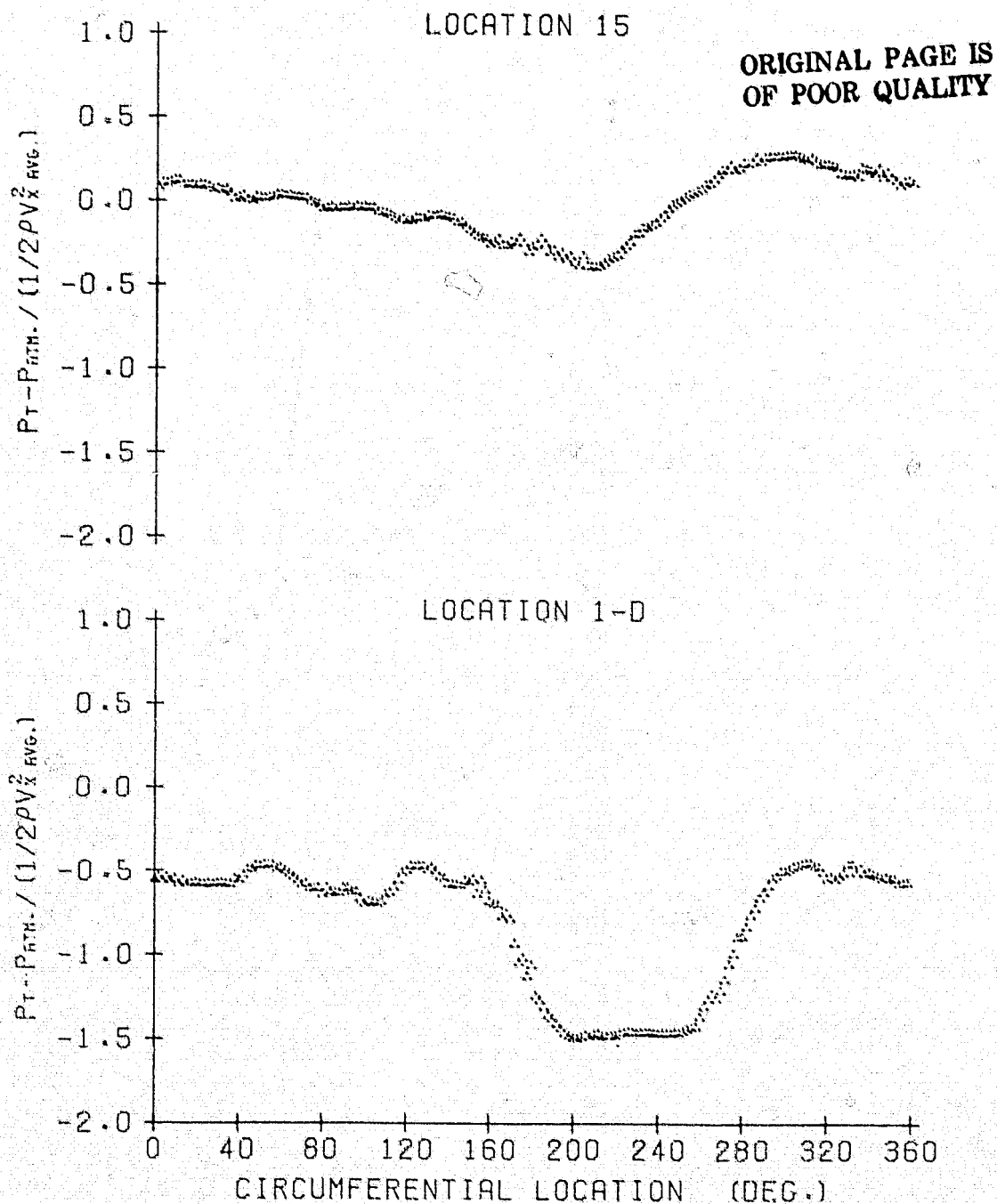


Figure F.40

10 October 1978

LCB:jep

6 BLADES

55 DEG. STAGGER ANGLE

90 DEG. SQ. DISTORTION

RPM = 1653

AVG. FLOW COEF. = 0.552

AVG. P-RISE COEF. = 0.785

AVG. INCIDENCE = 5.57 DEG.

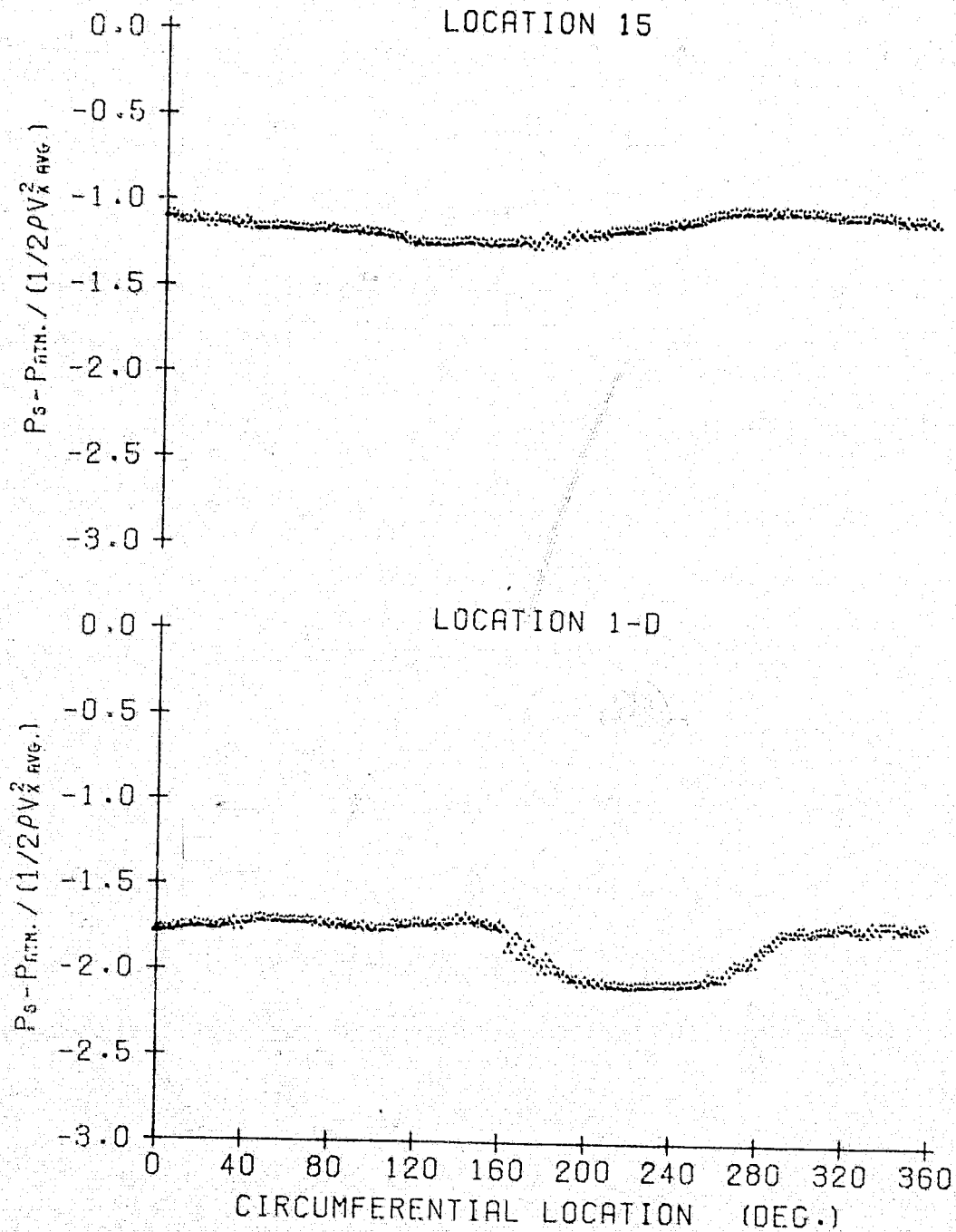


Figure F.41

10 October 1978
LCB:jep

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6 BLADES
55 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1653

AVG. FLOW COEF. = 0.552
AVG. P-RISE COEF. = 0.785
AVG. INCIDENCE = 5.57 DEG.

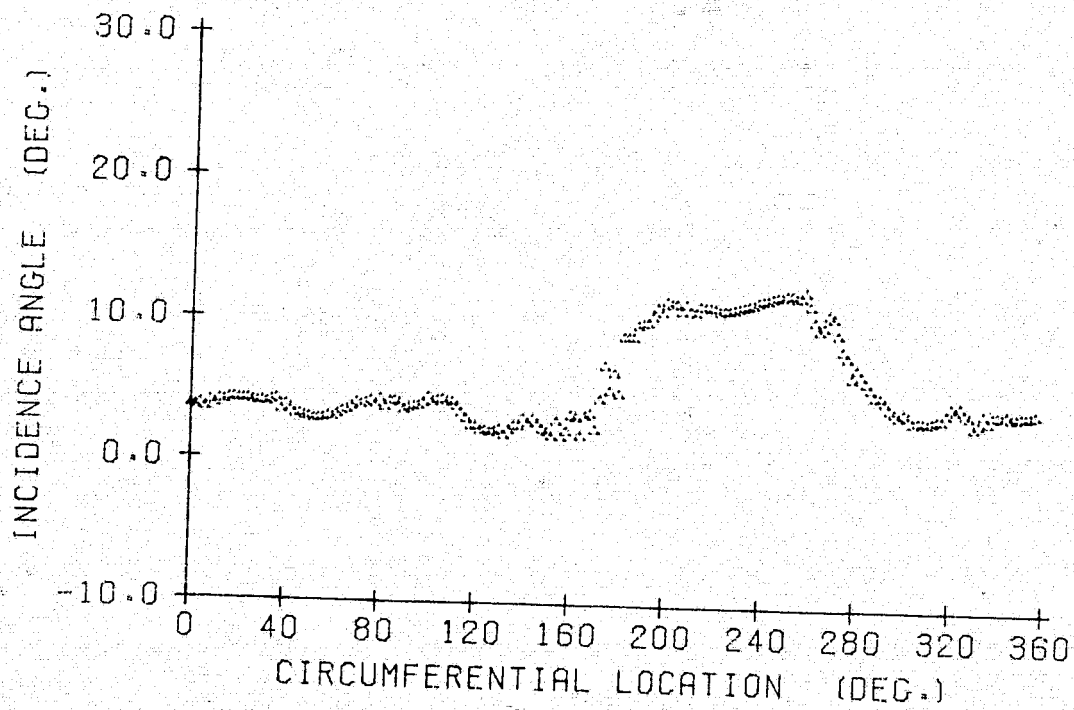


Figure F.42

10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1950

AVG. FLOW COEF. = 0.483
AVG. P-RISE COEF. = 1.787
AVG. INCIDENCE = 8.84 DEG.

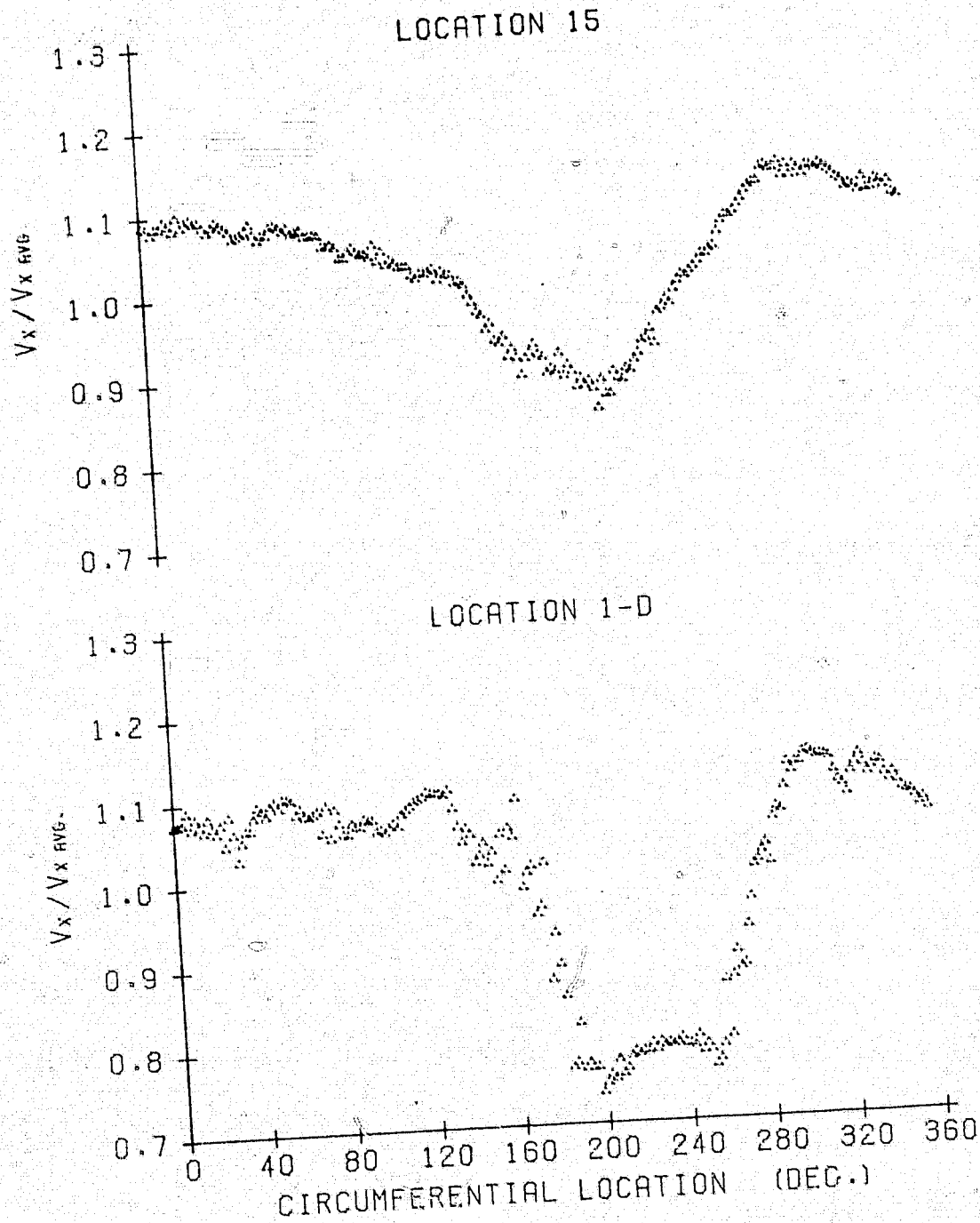


Figure F.43

10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1950

AVG. FLOW COEF. = 0.483
AVG. P-RISE COEF. = 1.787
AVG. INCIDENCE = 8.84 DEG.

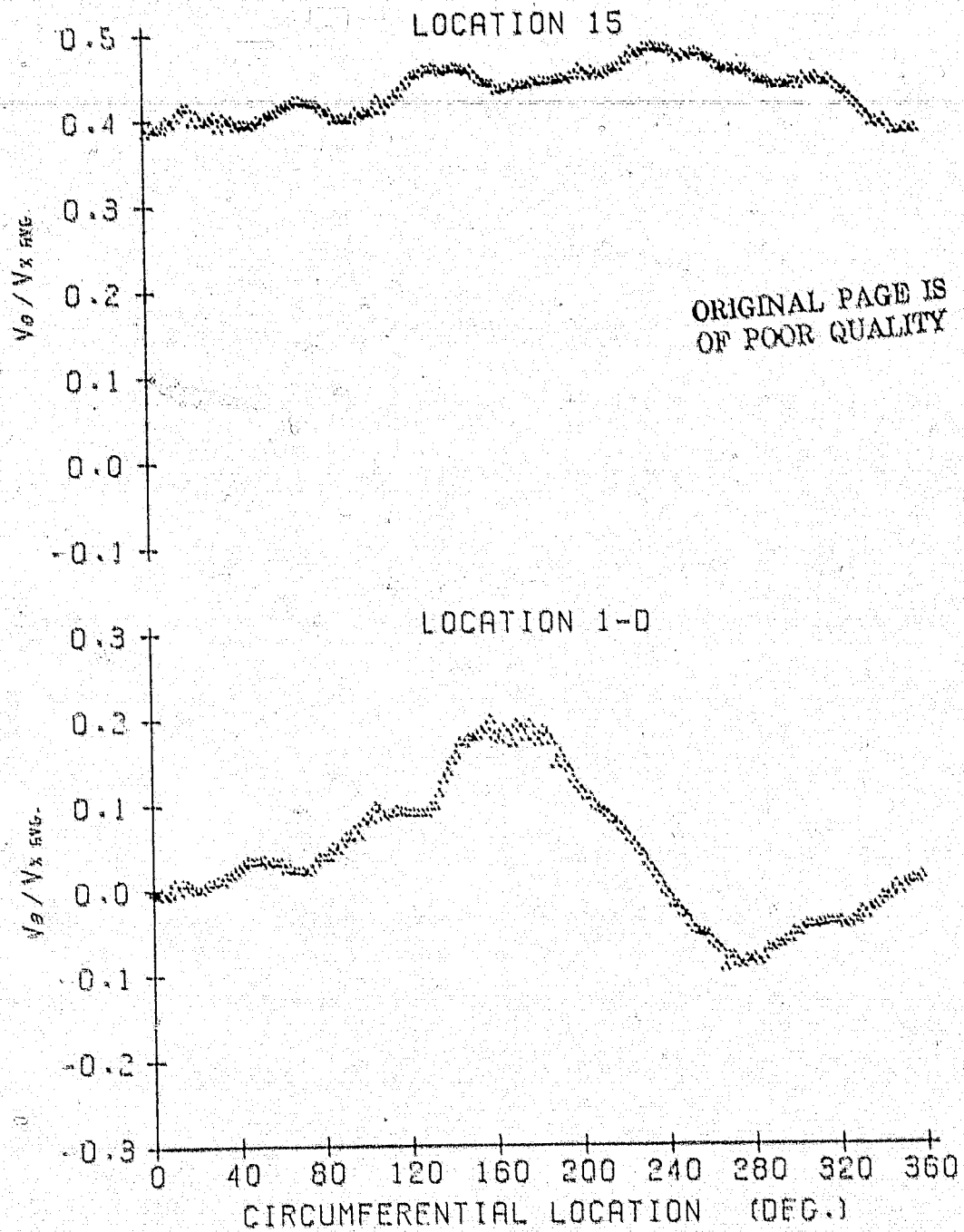


Figure F.44

10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1950

AVG. FLOW COEF. = 0.483
AVG. P-RISE COEF. = 1.787
AVG. INCIDENCE = 8.84 DEG.

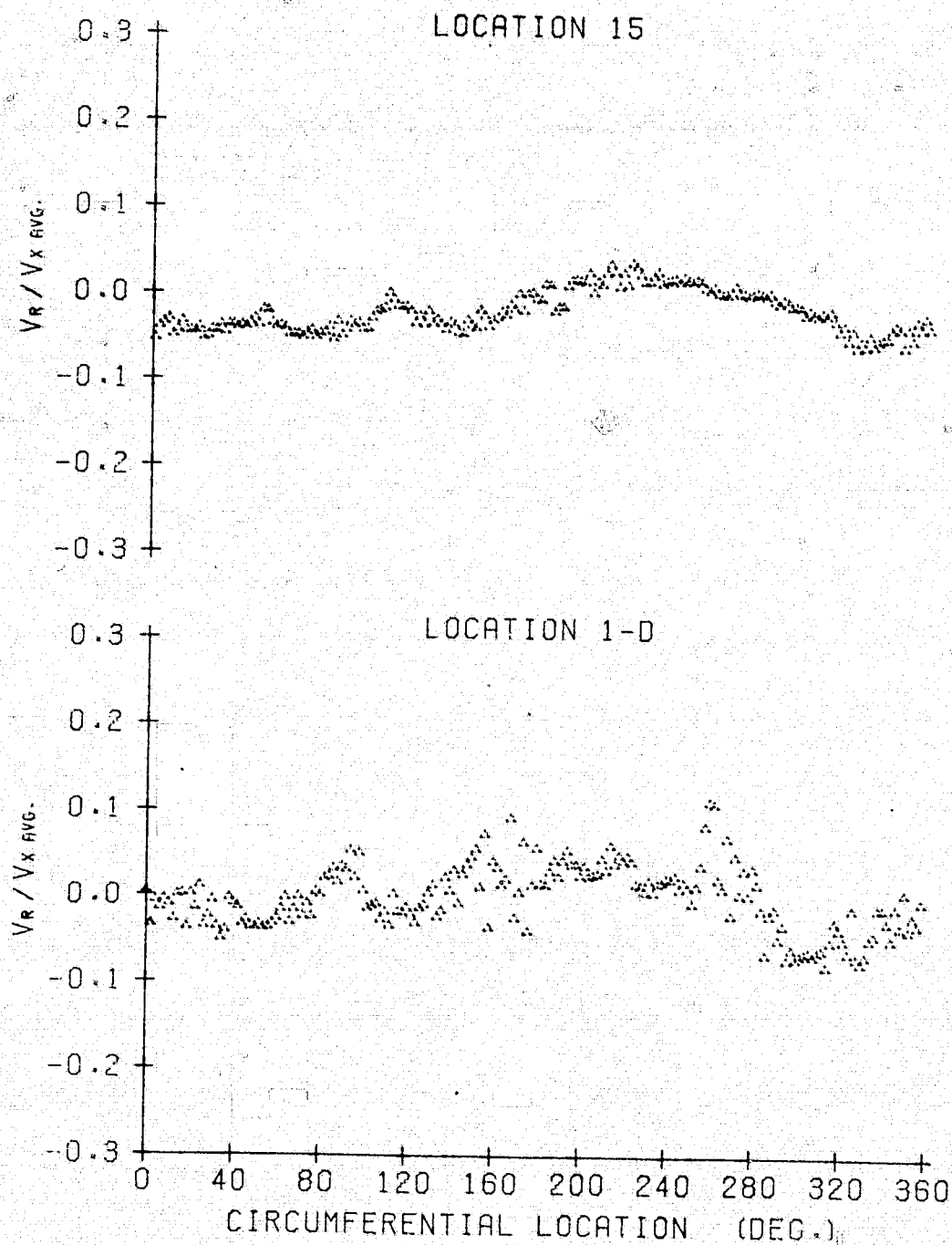


Figure F.45

6 BLADES

55 DEG. STAGGER ANGLE

90 DEG. SQ. DISTORTION

RPM : 1950

AVG. FLOW COEF. = 0.483

AVG. P-RISE COEF. = 1.787

AVG. INCIDENCE = 8.84 DEG.

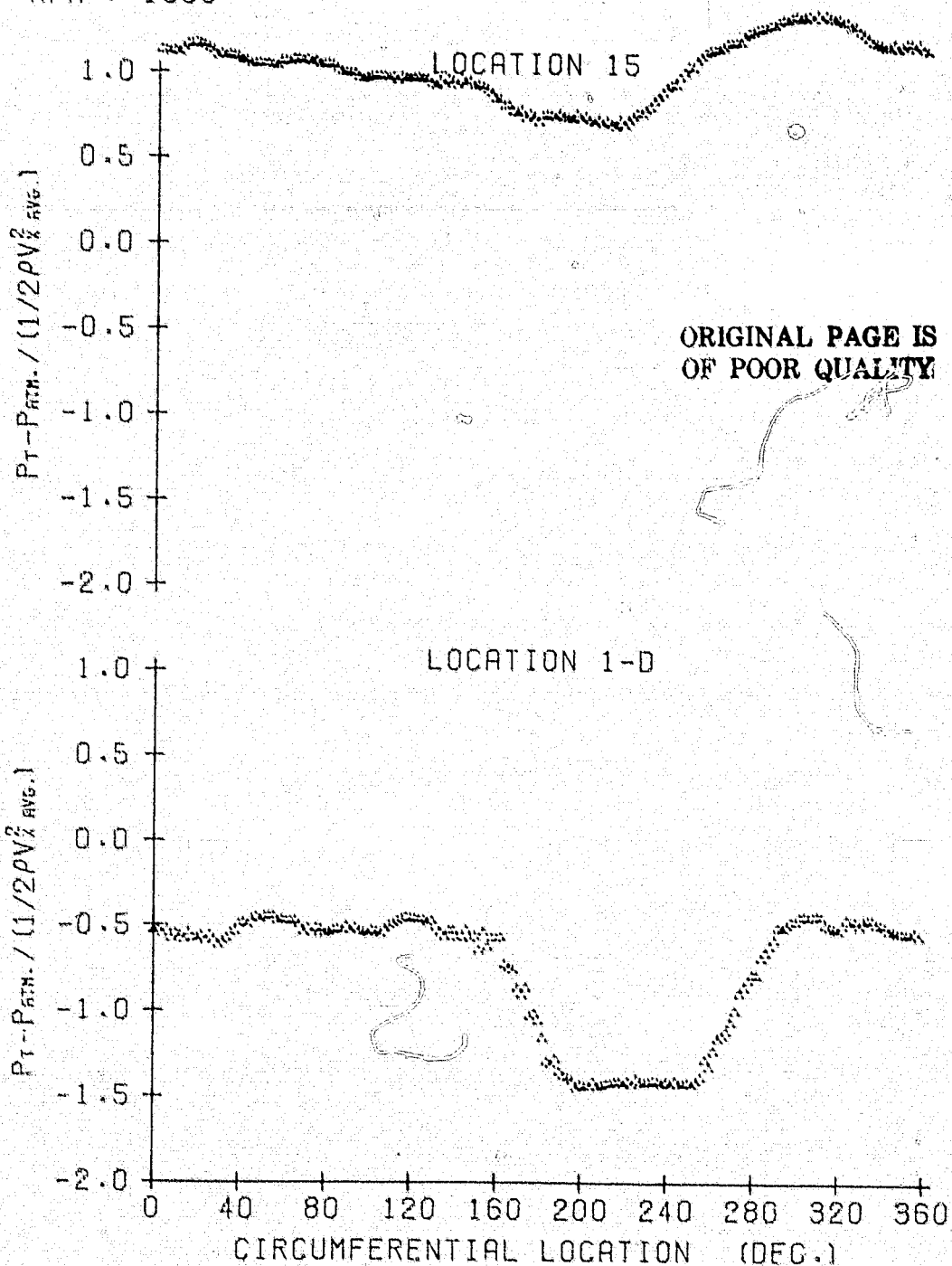


Figure F.46

10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1950

AVG. FLOW COEF. = 0.483
AVG. P-RISE COEF. = 1.787
AVG. INCIDENCE = 8.84 DEG.

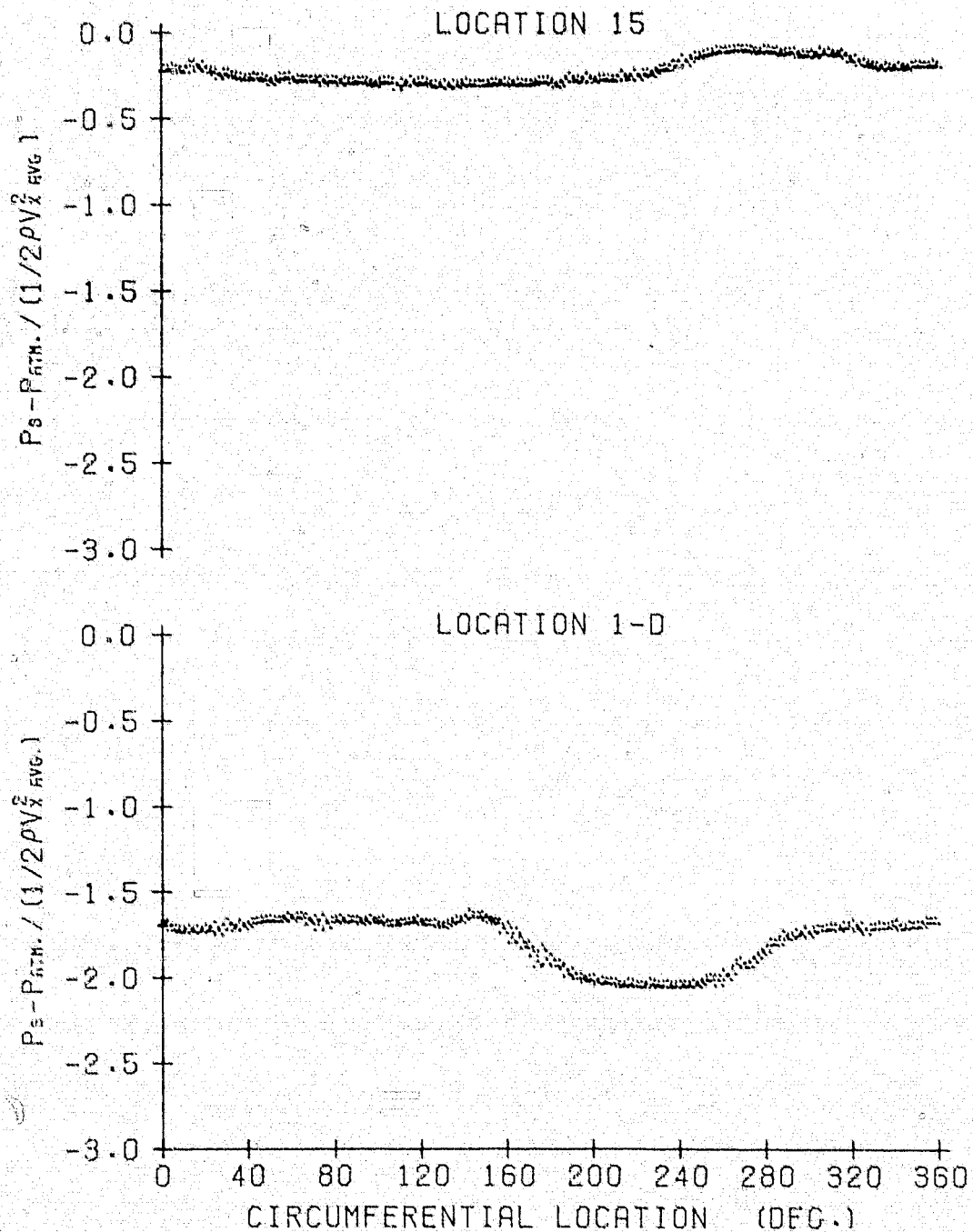


Figure F.47

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10 October 1978
LCB:jep

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6 BLADES
55 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1950

AVG. FLOW COEF. = 0.483
AVG. P-RISE COEF. = 1.787
AVG. INCIDENCE = 8.84 DEG.

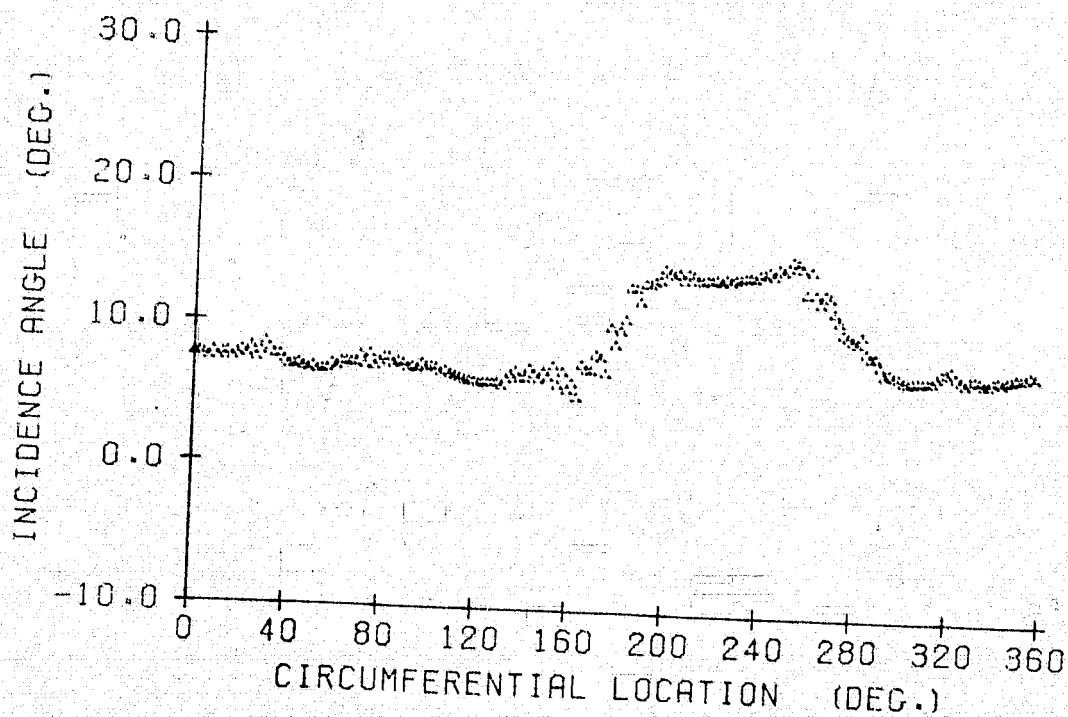


Figure F.48

10 October 1978
LCB:jep

9 BLADES

50 DEG. STAGGER ANGLE

90 DEG. SQ. DISTORTION

RPM = 1521

AVG. FLOW COEF. = 0.616

AVG. P-RISE COEF. = 1.260

AVG. INCIDENCE = 2.08 DEG.

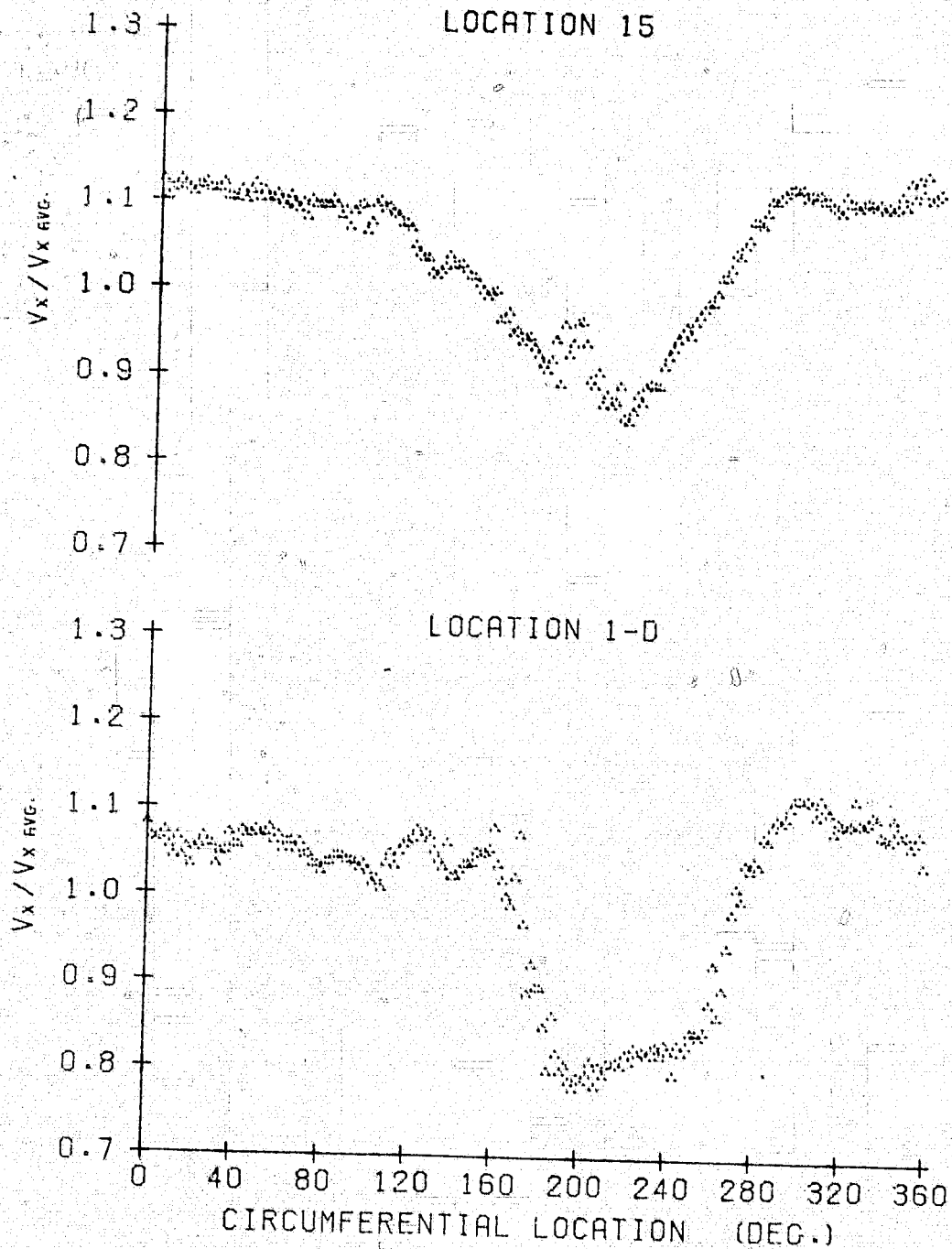


Figure F.49

10 October 1978
LCB:jep

9 BLADES

50 DEG. STAGGER ANGLE

90 DEG. SQ. DISTORTION

RPM = 1521

AVG. FLOW COEF. = 0.616

AVG. P-RISE COEF. = 1.260

AVG. INCIDENCE = 2.08 DEG.

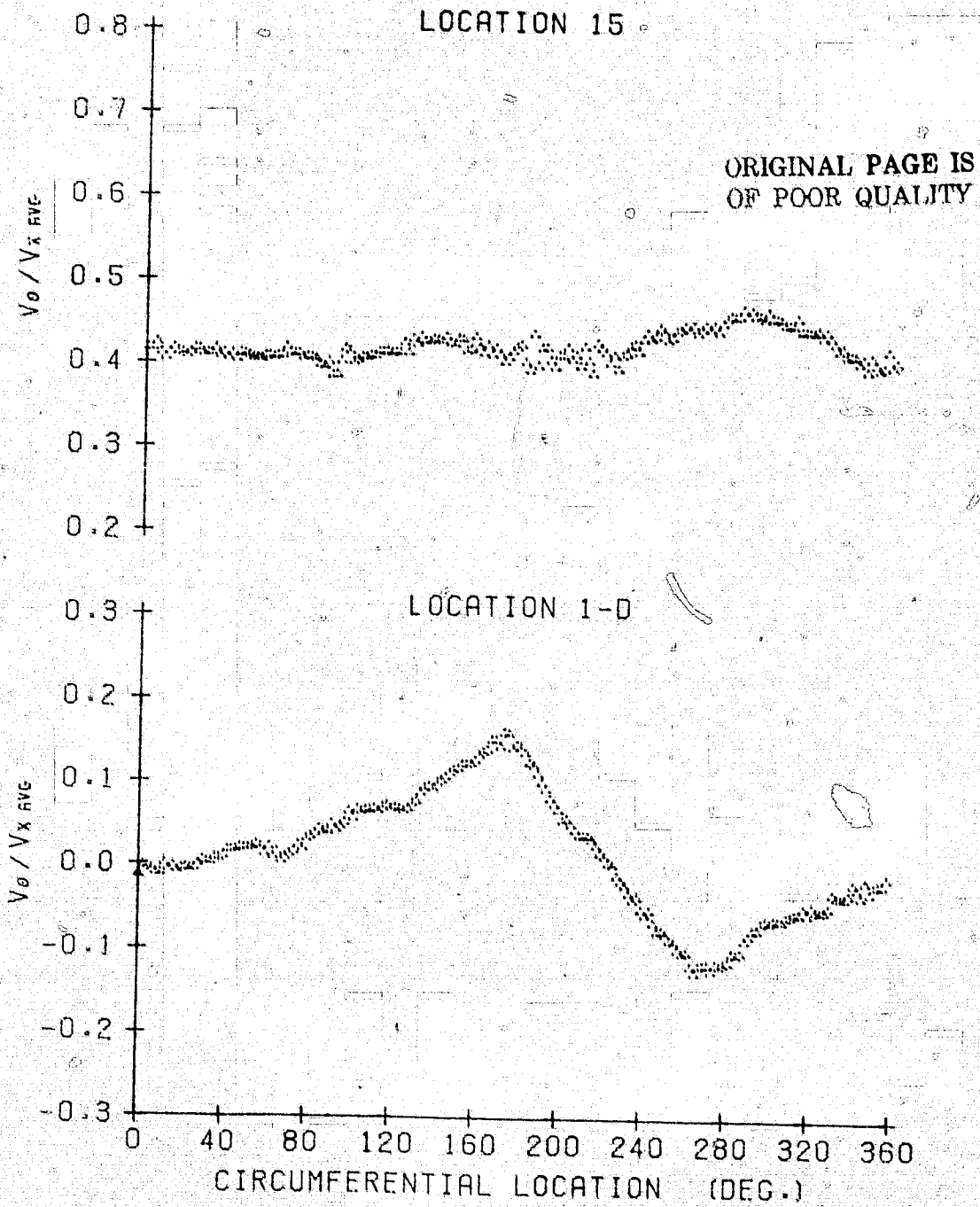


Figure F.50

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1521

AVG. FLOW COEF. = 0.616
AVG. P-RISE COEF. = 1.260
AVG. INCIDENCE = 2.08 DEG.

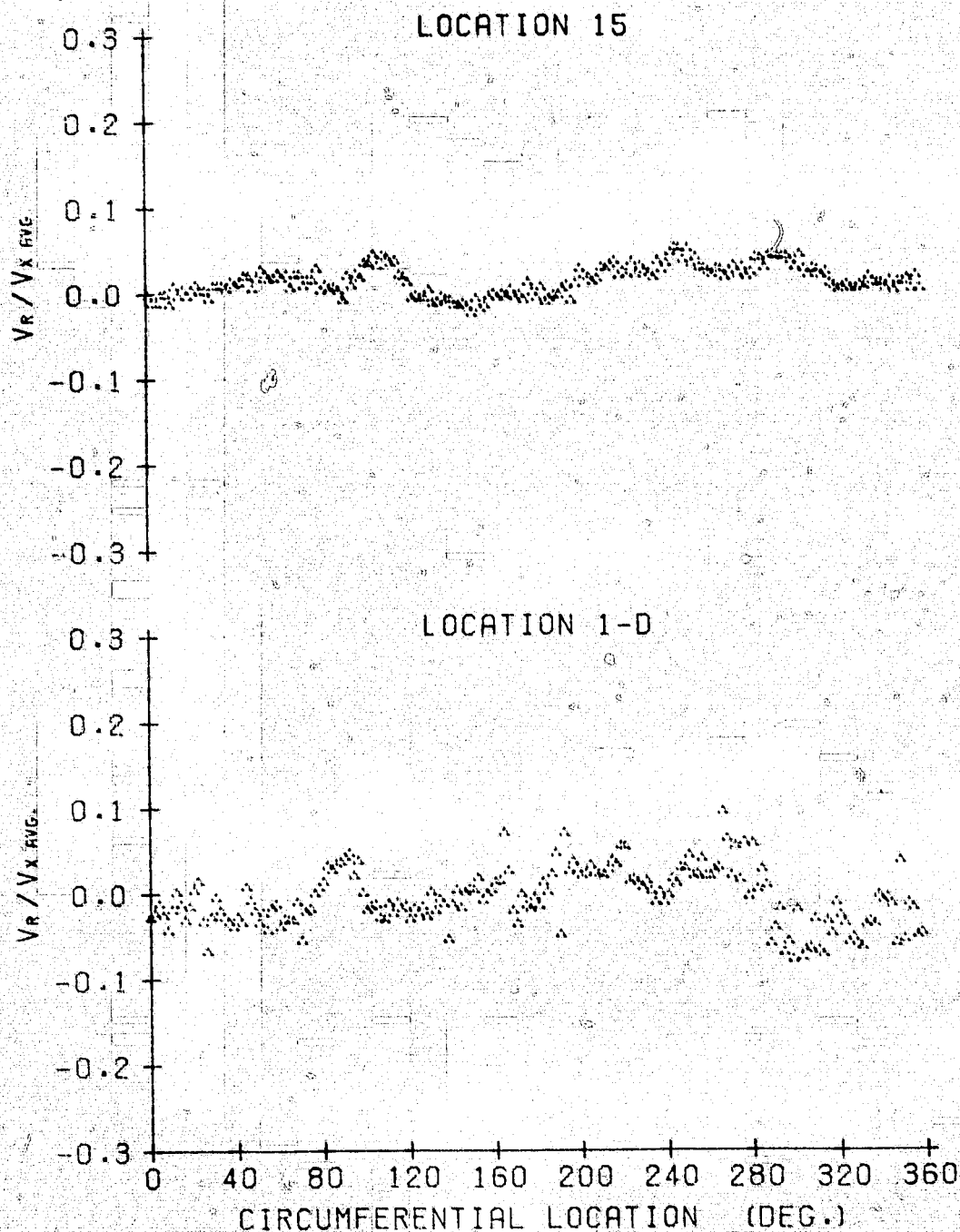


Figure F.51

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1521

AVG. FLOW COEF. = 0.616
AVG. P-RISE COEF. = 1.260
AVG. INCIDENCE = 2.08 DEG.

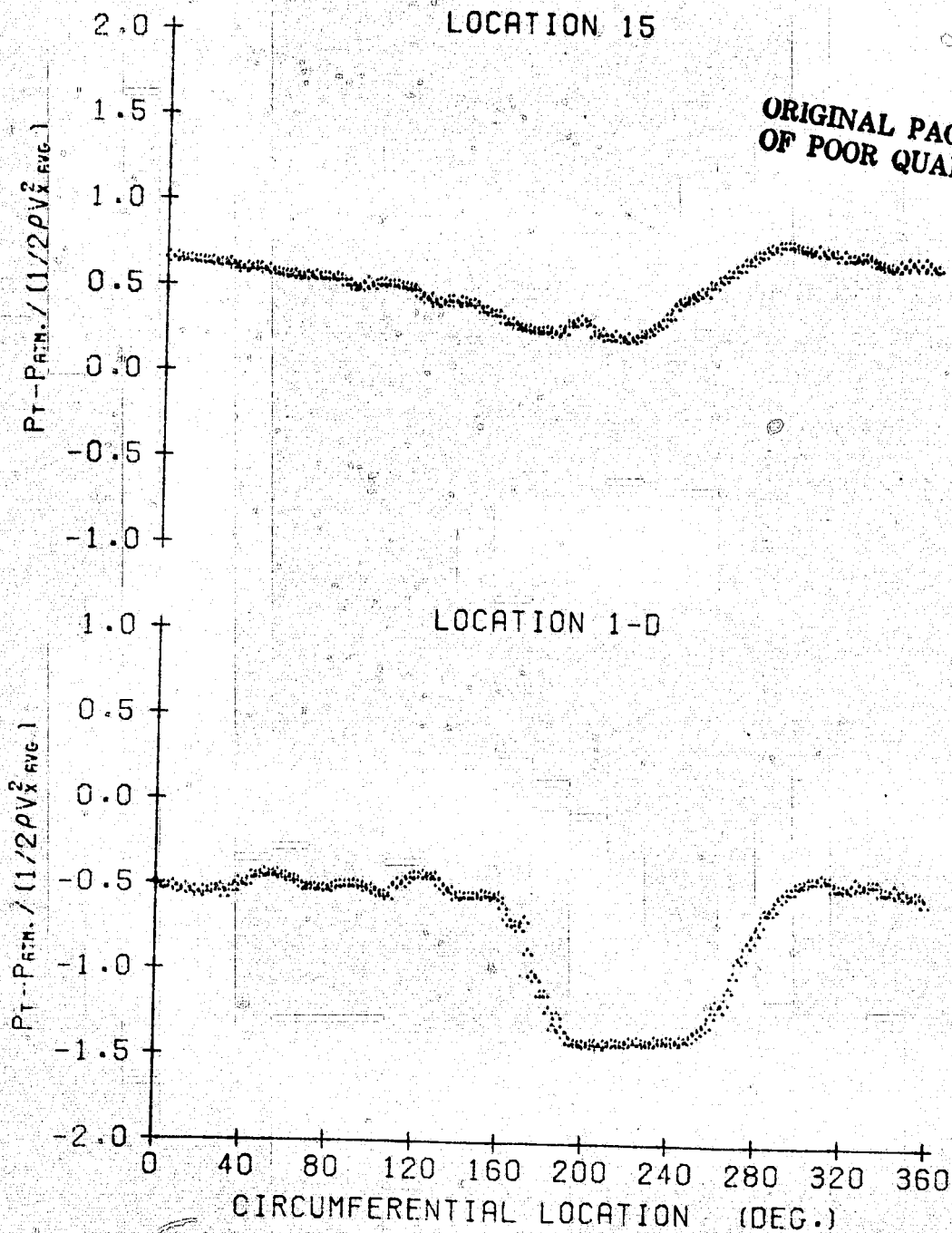


Figure F.52

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1521

AVG. FLOW COEF. = 0.616
AVG. P-RISE COEF. = 1.260
AVG. INCIDENCE = 2.08 DEG.

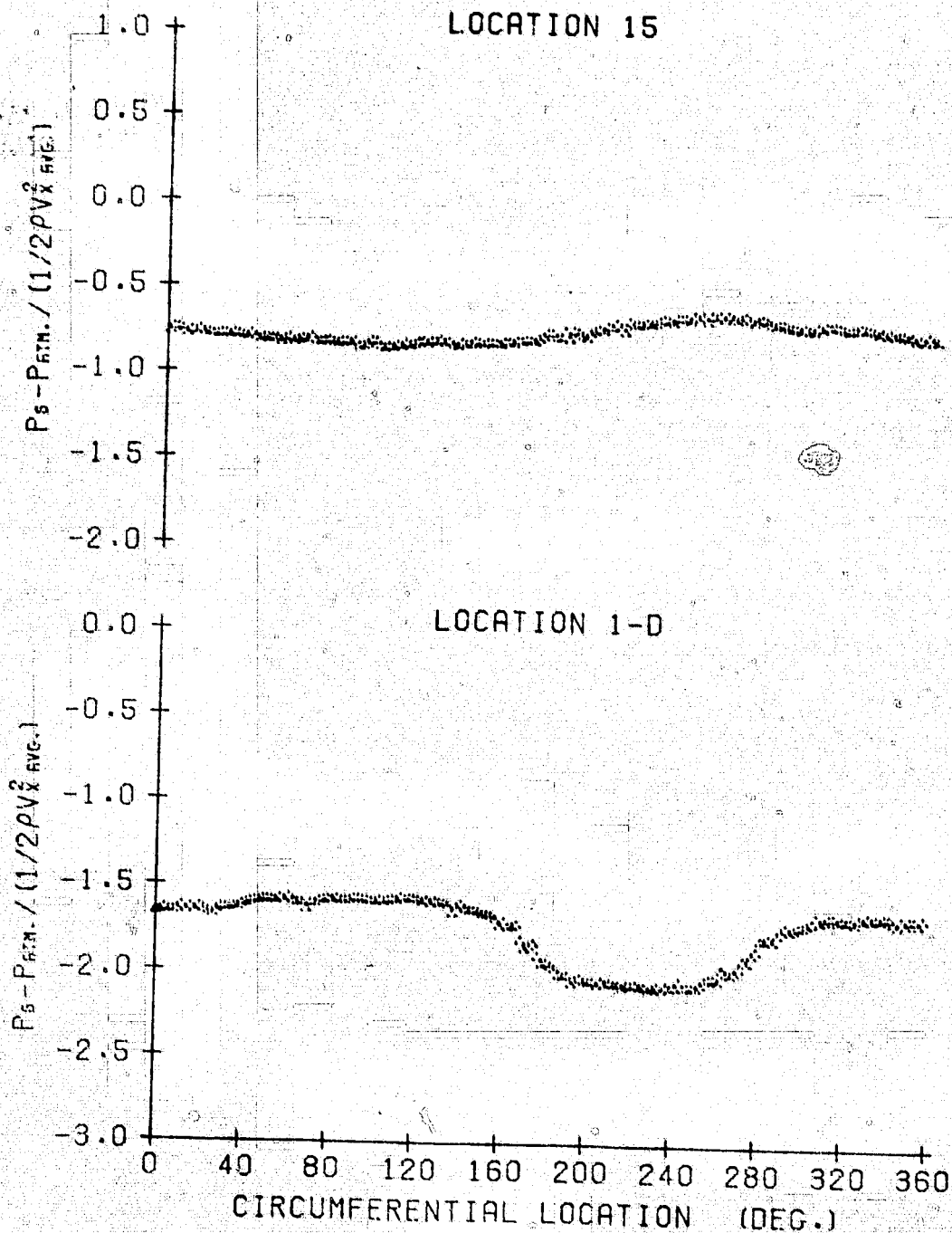


Figure F.53

10 October 1978
LCB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1521

AVG. FLOW COEF. = 0.616
AVG. P-RISE COEF. = 1.260
AVG. INCIDENCE = 2.08 DEG.

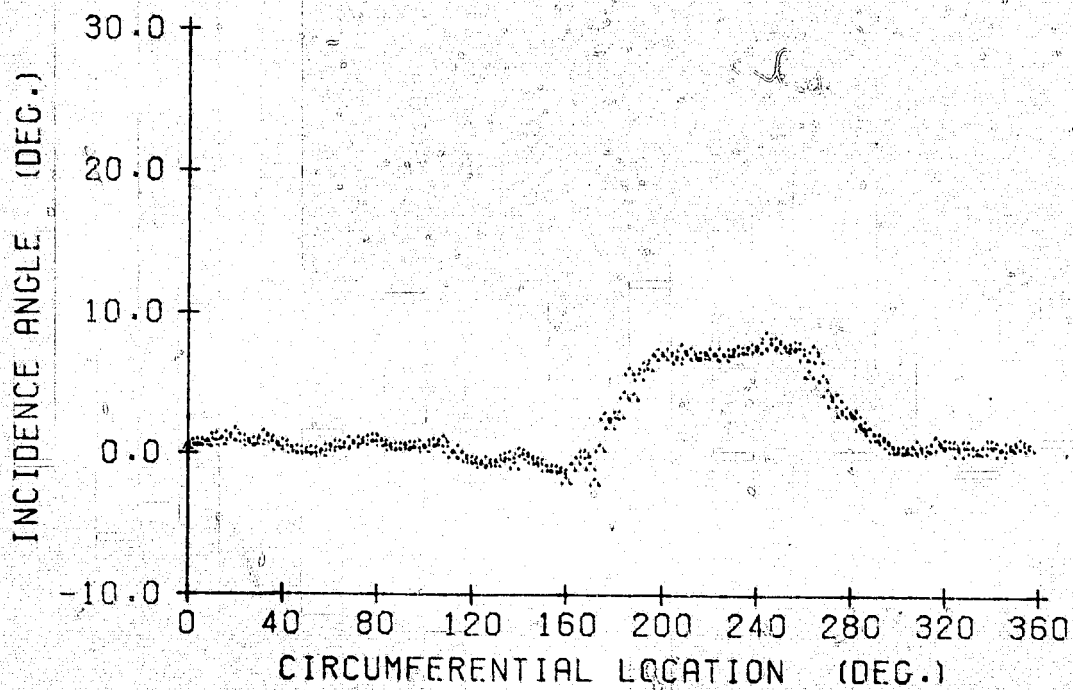


Figure F.54

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10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1695

AVG. FLOW COEF. = 0.574
AVG. P-RISE COEF. = 1.800
AVG. INCIDENCE = 3.84 DEG.

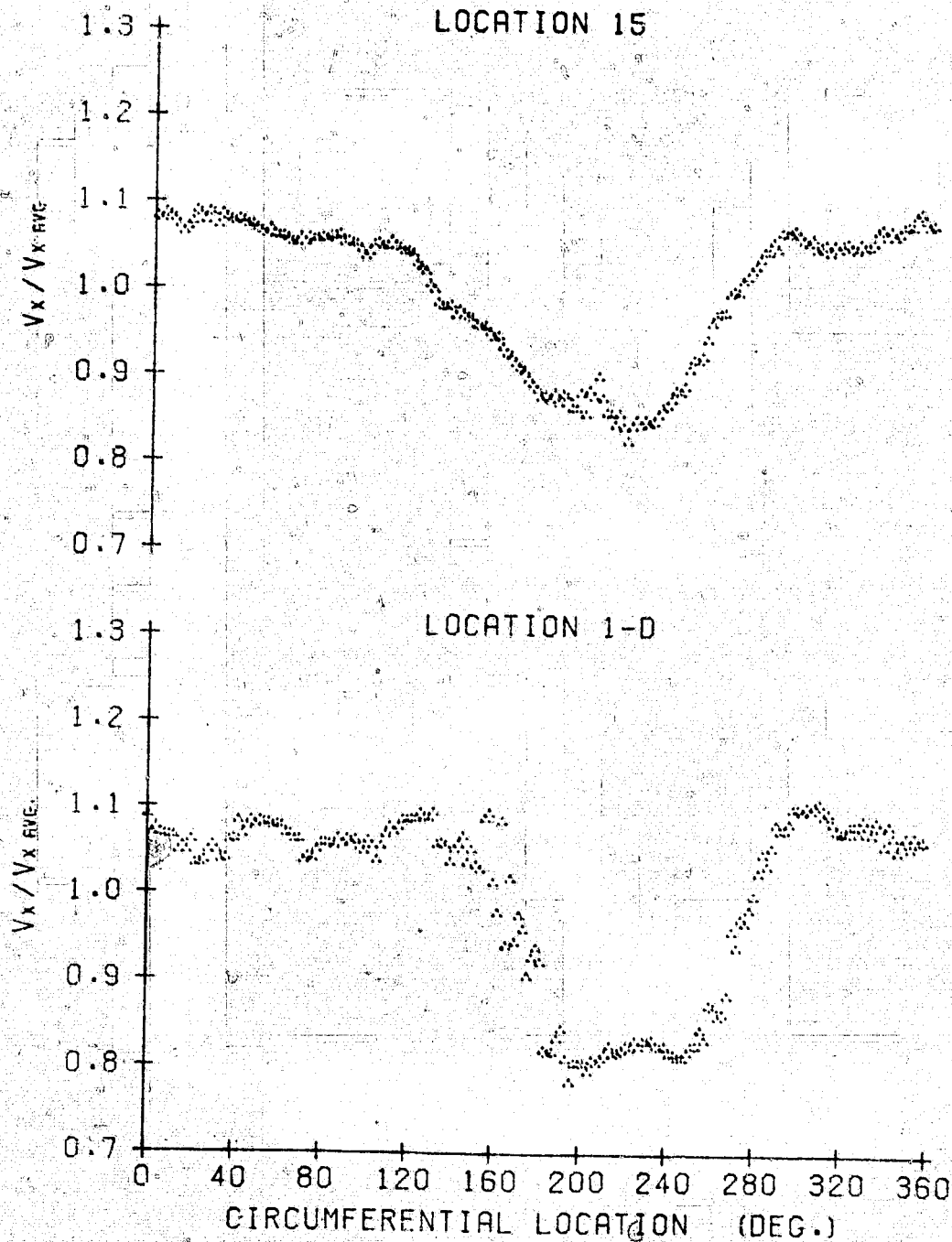


Figure F.55

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10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1695

AVG. FLOW COEF. = 0.574
AVG. P-RISE COEF. = 1.800
AVG. INCIDENCE = 3.84 DEG.

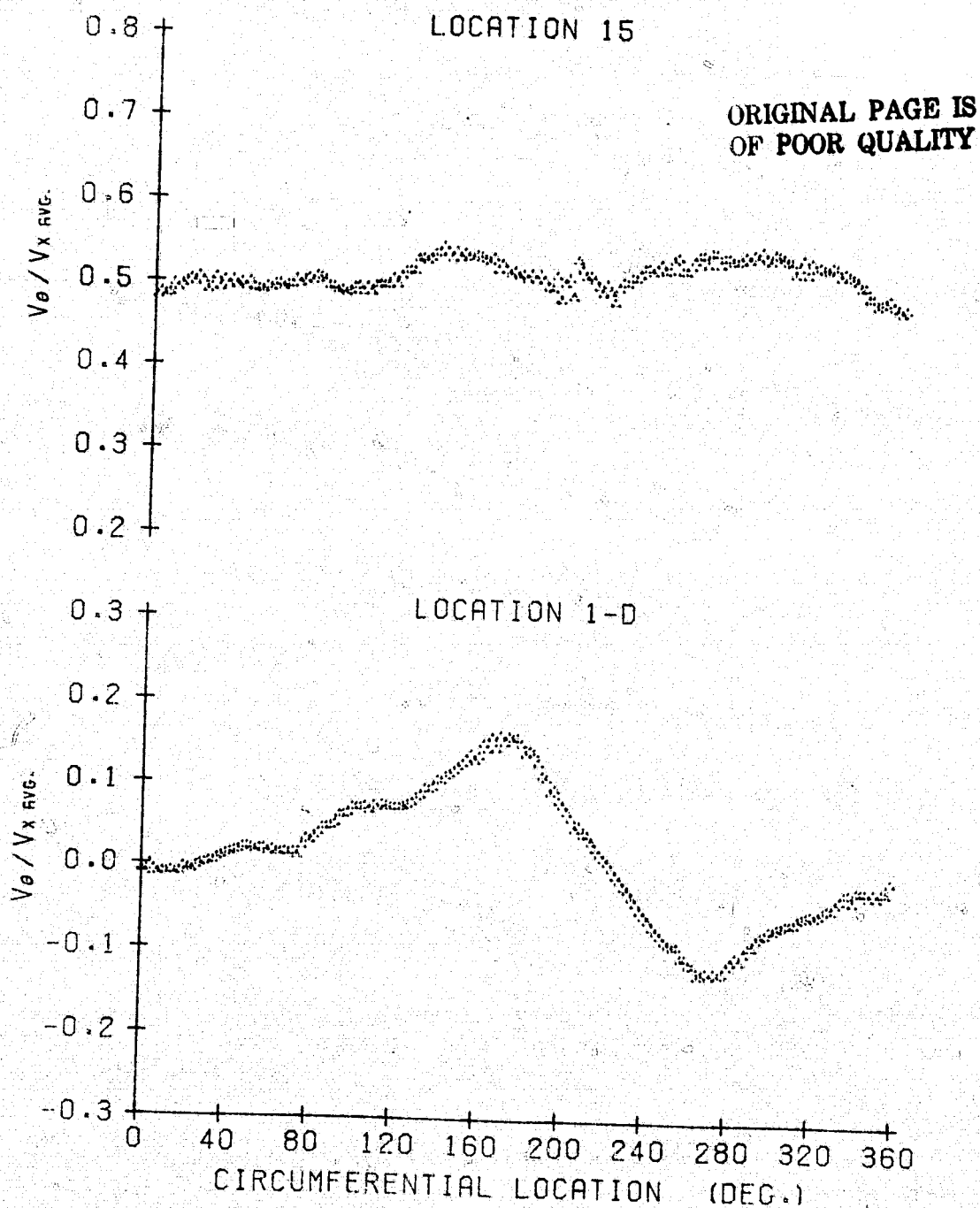


Figure F.56

9 BLADES
 50 DEG. STAGGER ANGLE
 90 DEG. SQ. DISTORTION
 RPM = 1695

AVG. FLOW COEF. = 0.574
 AVG. P-RISE COEF. = 1.800
 AVG. INCIDENCE = 3.84 DEG.

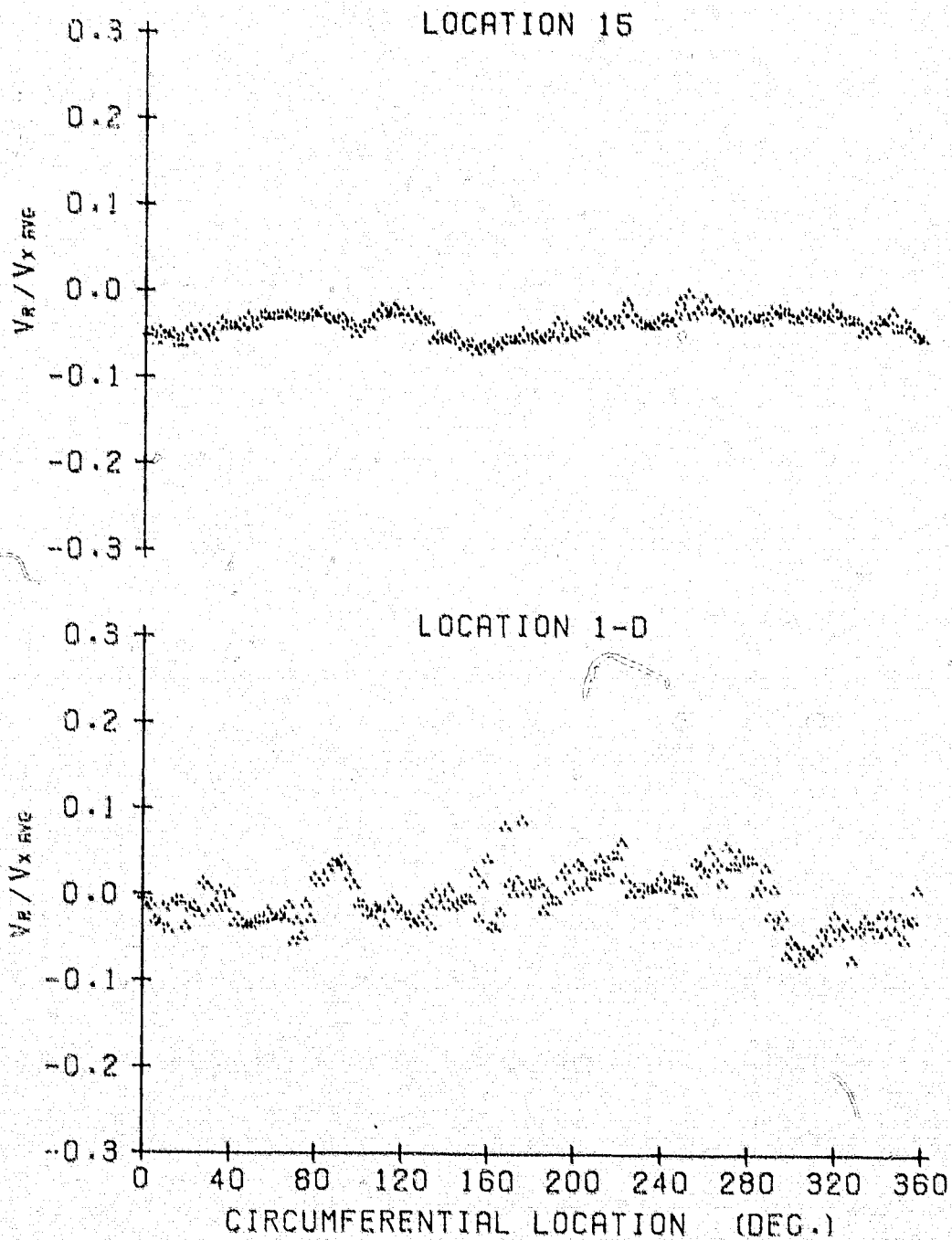


Figure F.57

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1695

AVG. FLOW COEFF. = 0.574
AVG. P-RISE COEFF. = 1.800
AVG. INCIDENCE = 3.84 DEG.

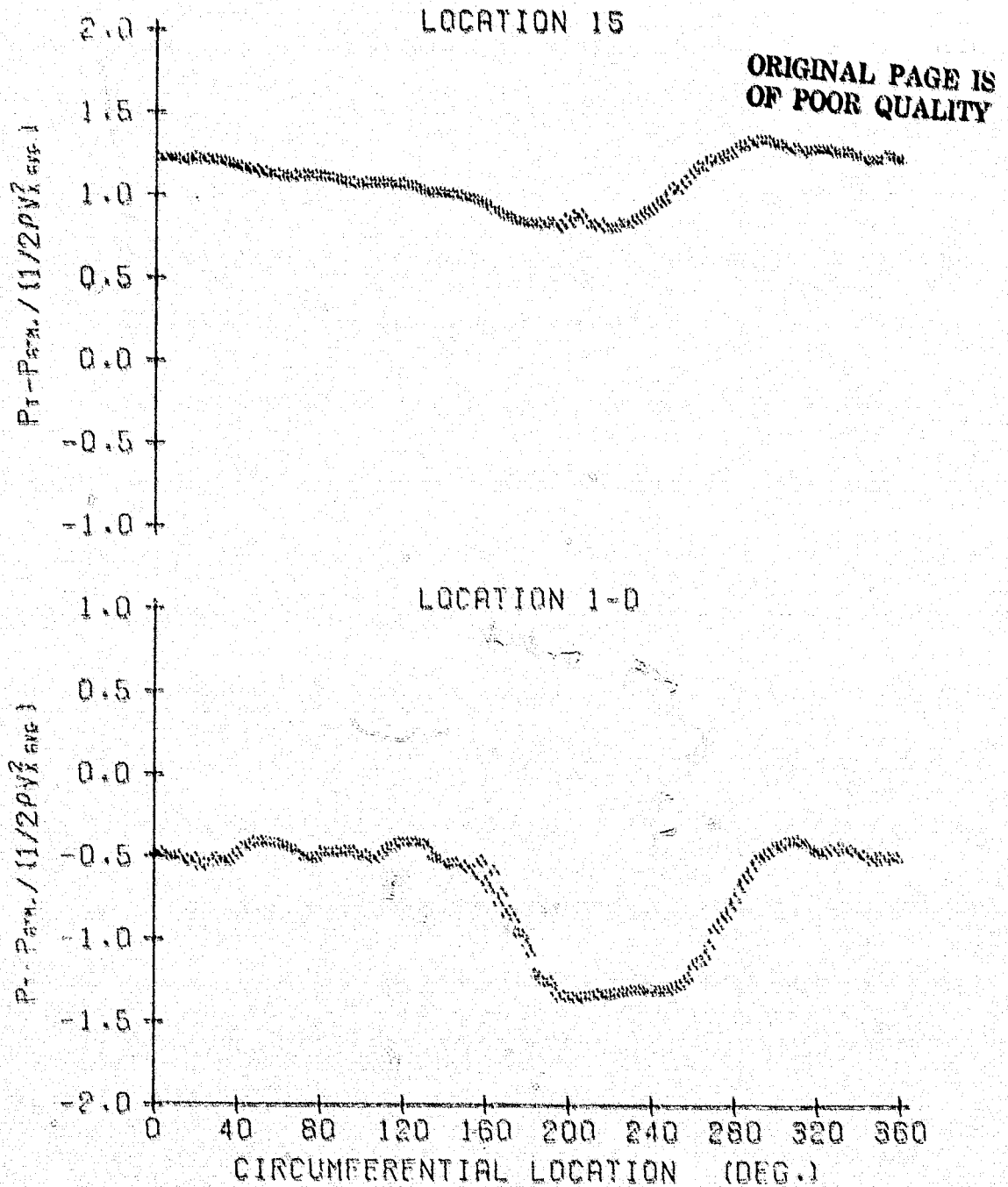


Figure F.58

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1695

AVG. FLOW COEF. = 0.574
AVG. P-RISE COEF. = 1.800
AVG. INCIDENCE = 3.84 DEG.

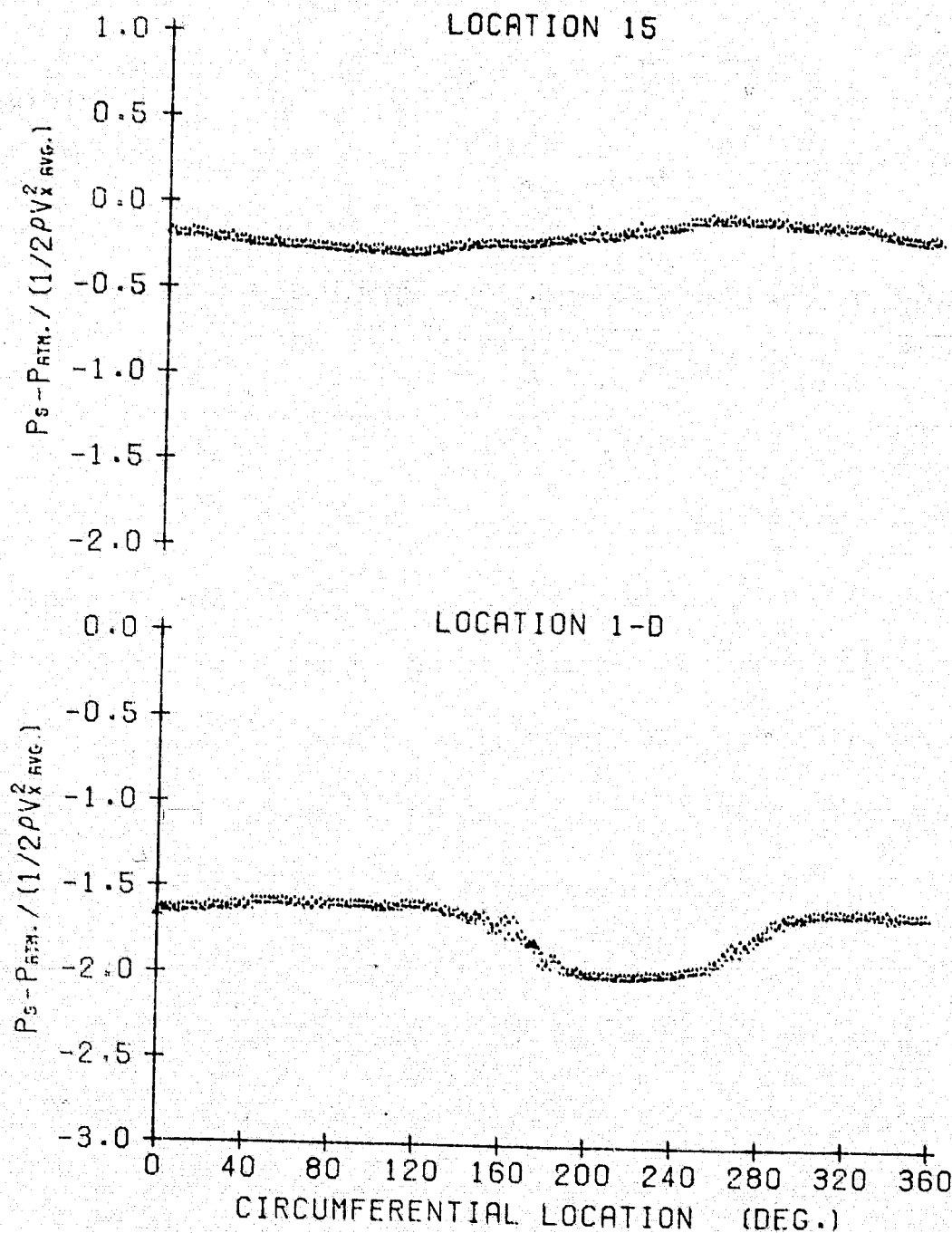


Figure F.59

10 October 1978
LCB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1695
AVG. FLOW COEF. = 0.574
AVG. P-RISE COEF. = 1.800
AVG. INCIDENCE = 3.84 DEG.

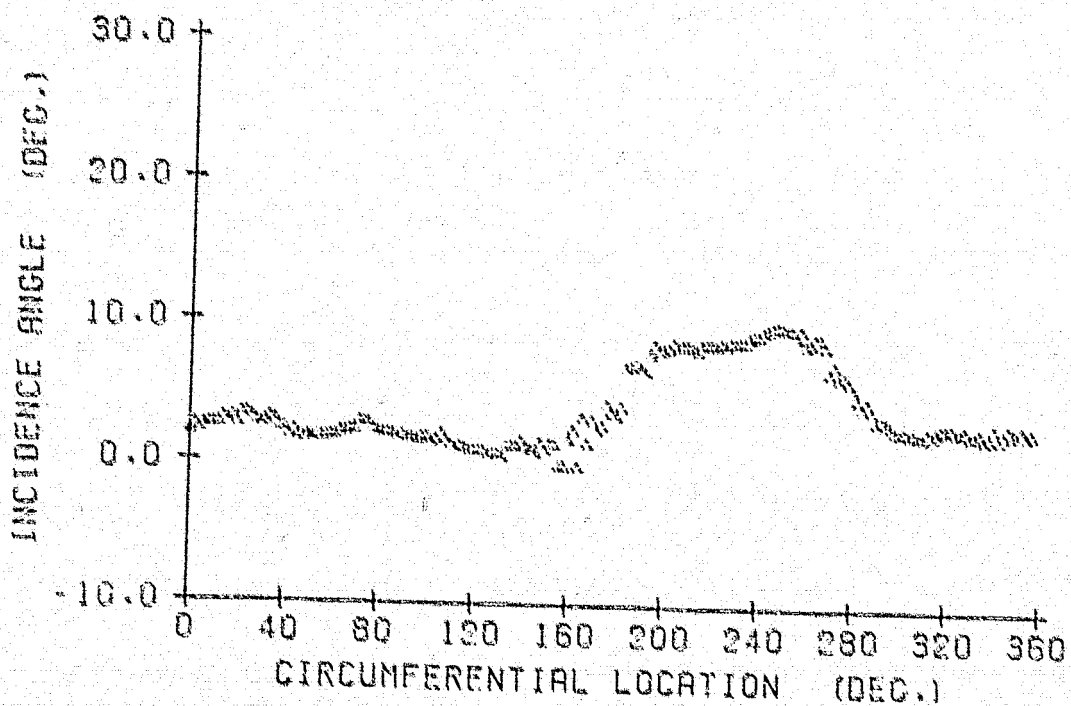


Figure F.60

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
30 DEG. SQ. DISTORTION
RPM = 1833

AVG. FLOW COEF. = 0.523
AVG. P-RISE COEF. = 2.494
AVG. INCIDENCE = 6.09 DEG.

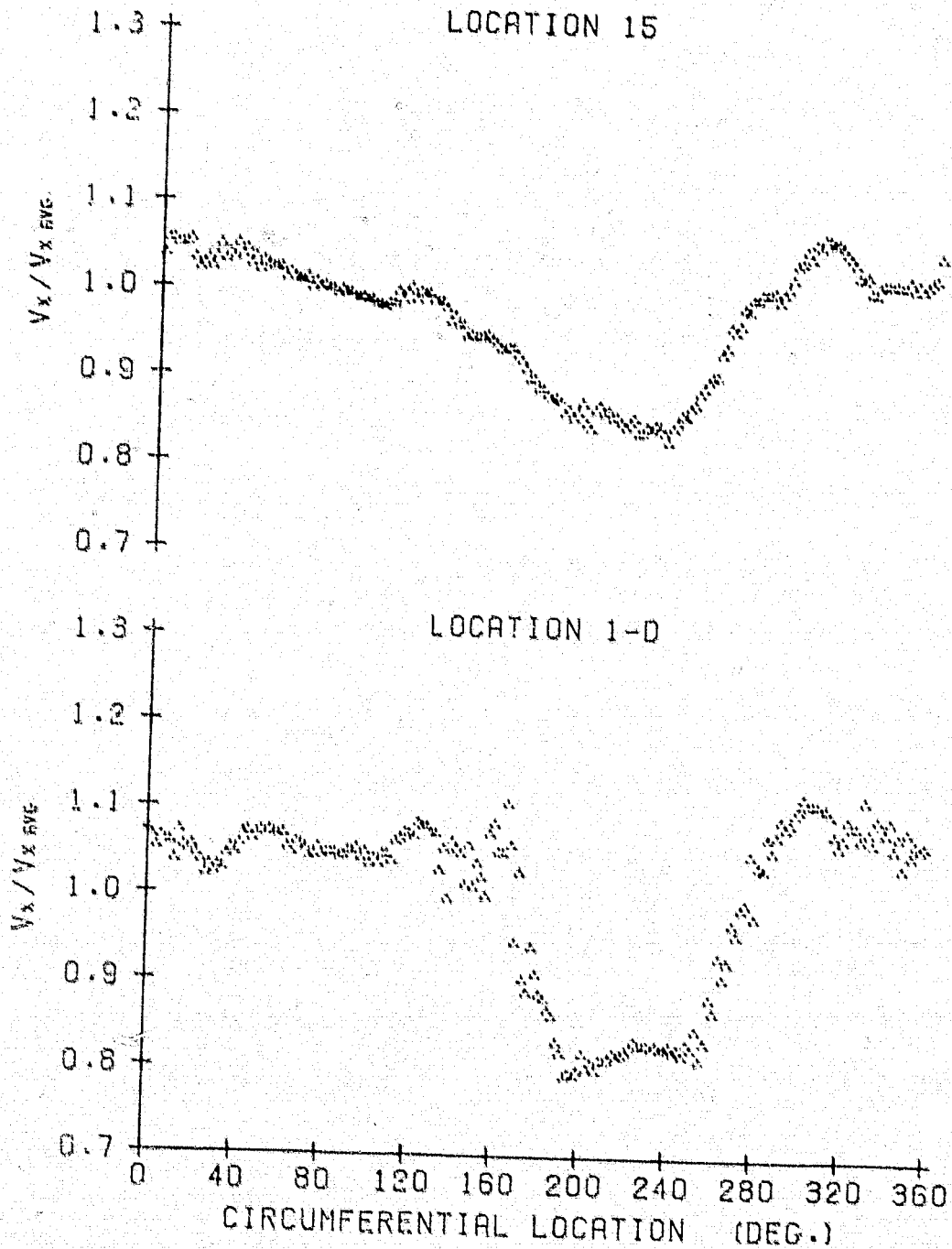


Figure F.61

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1833

AVG. FLOW COEFF. = 0.523
AVG. P-RISE COEFF. = 2.494
AVG. INCIDENCE = 6.09 DEG.

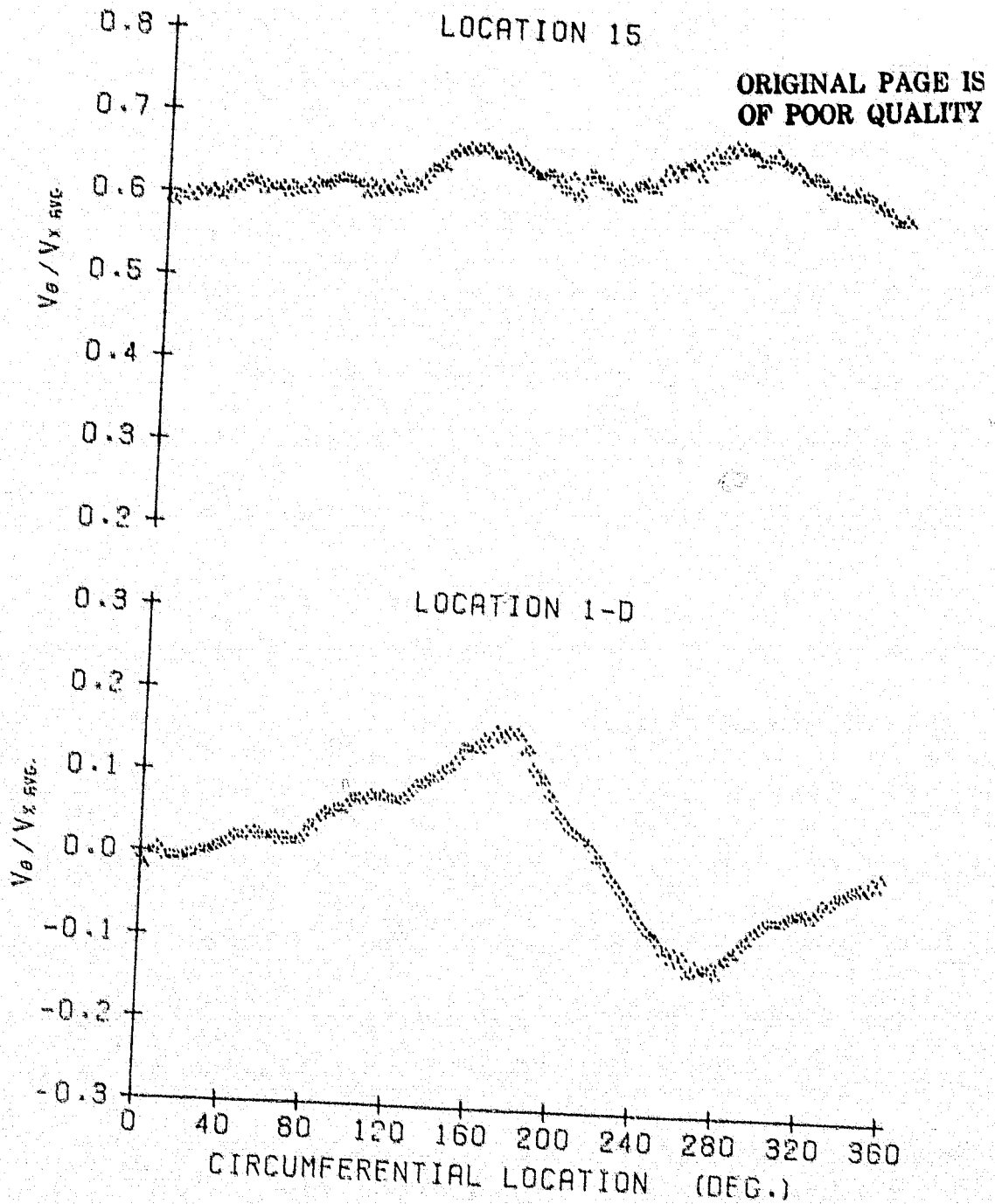


Figure F.62

10 October 1978
LGB:jep

3 BLADES
90 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1833

AVG. FLOW COEFF. = 0.523
AVG. P-RISE COEFF. = 2.494
AVG. INCIDENCE = 6.09 DEG.

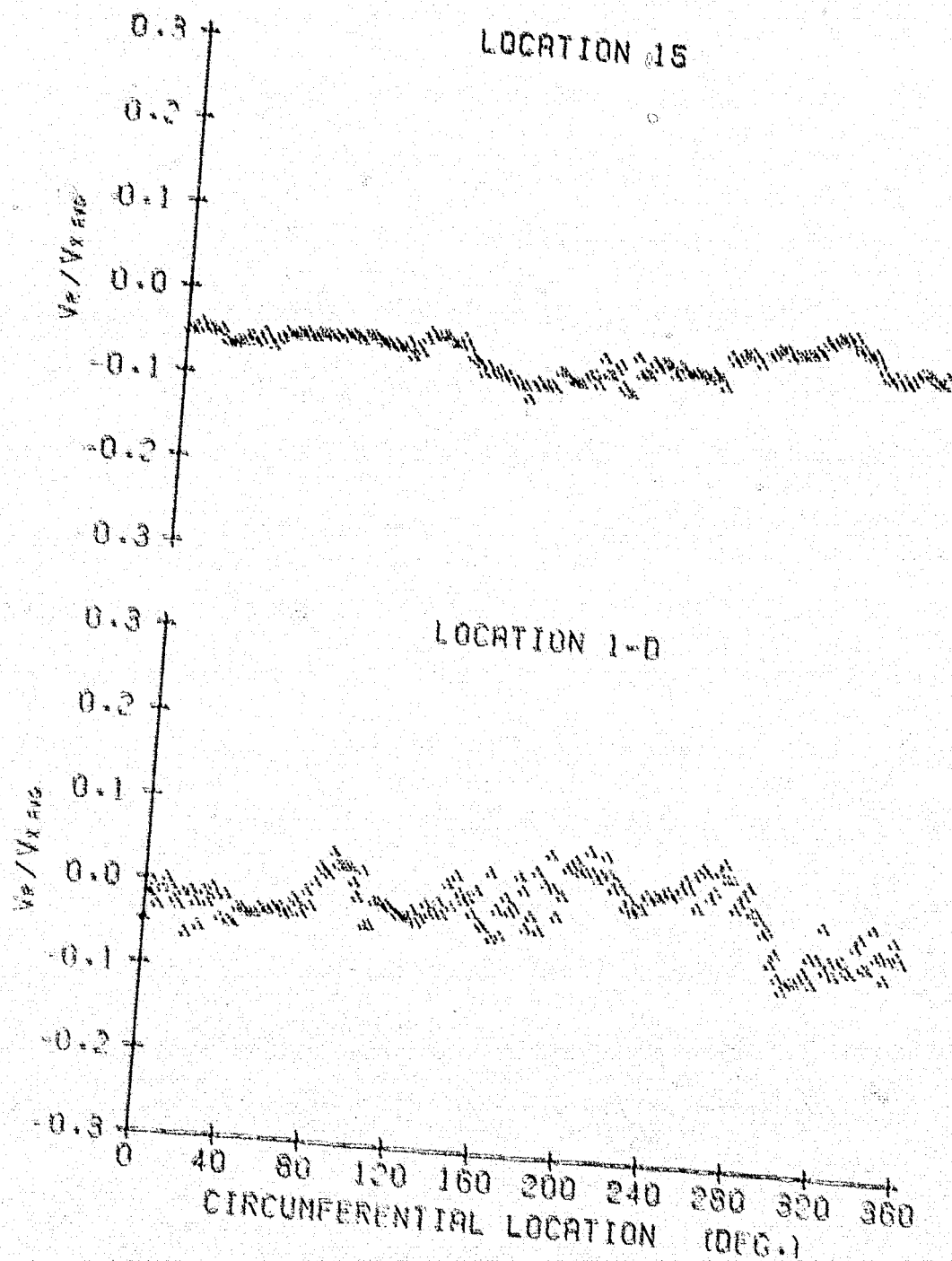


Figure F.63

10 October 1978
LCB:jep

3 BLADES
50 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1833

AVG. FLOW COEFF. = 0.523
AVG. P-RISE COEF. = 2.494
AVG. INCIDENCE = 6.09 DEG.

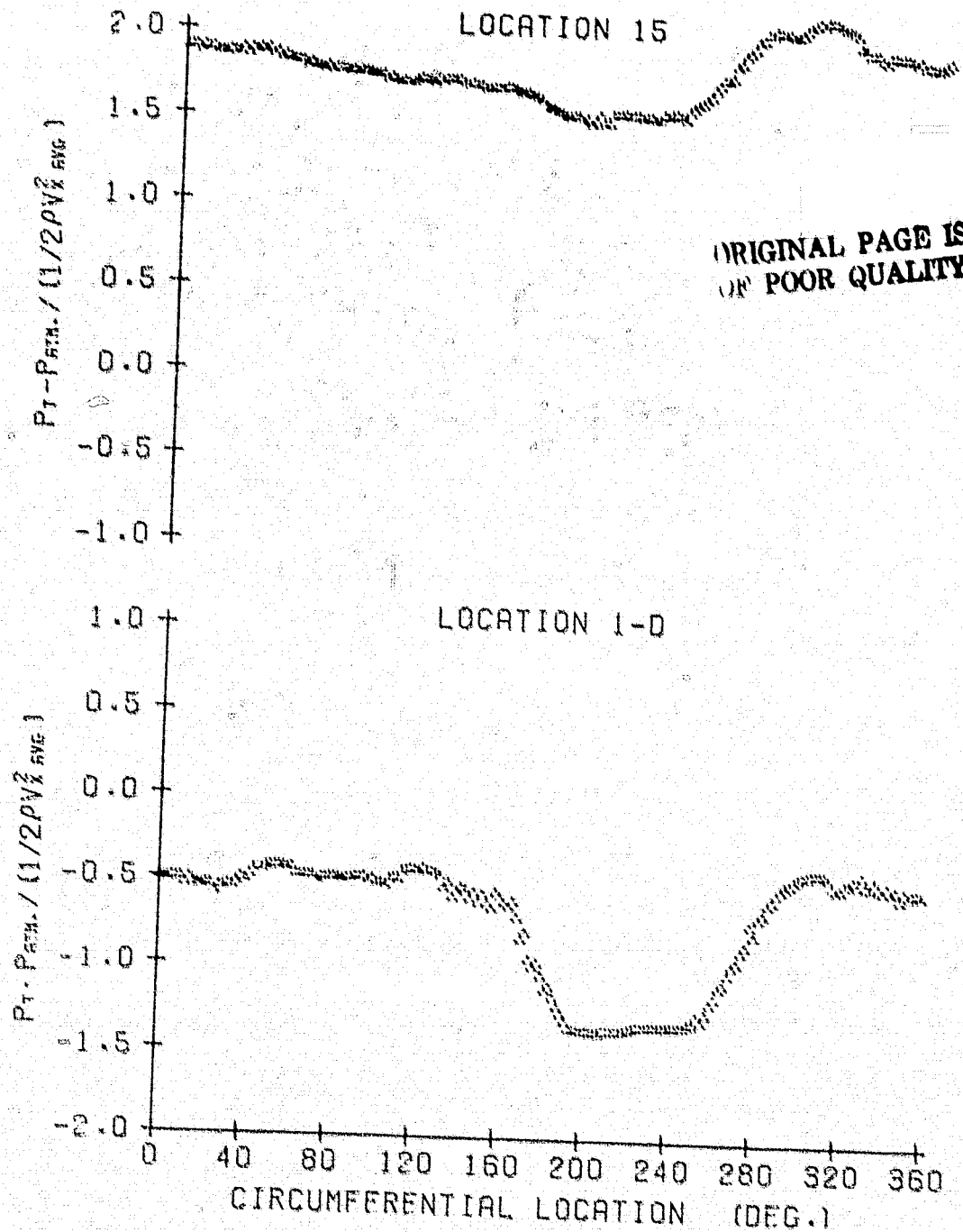


Figure F.64

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
30 DEG. SQ. DISTORTION
RPM = 1833

AVG. FLOW COEF. = 0.523
AVG. P-RISE COEF. = 2.494
AVG. INCIDENCE = 6.09 DEG.

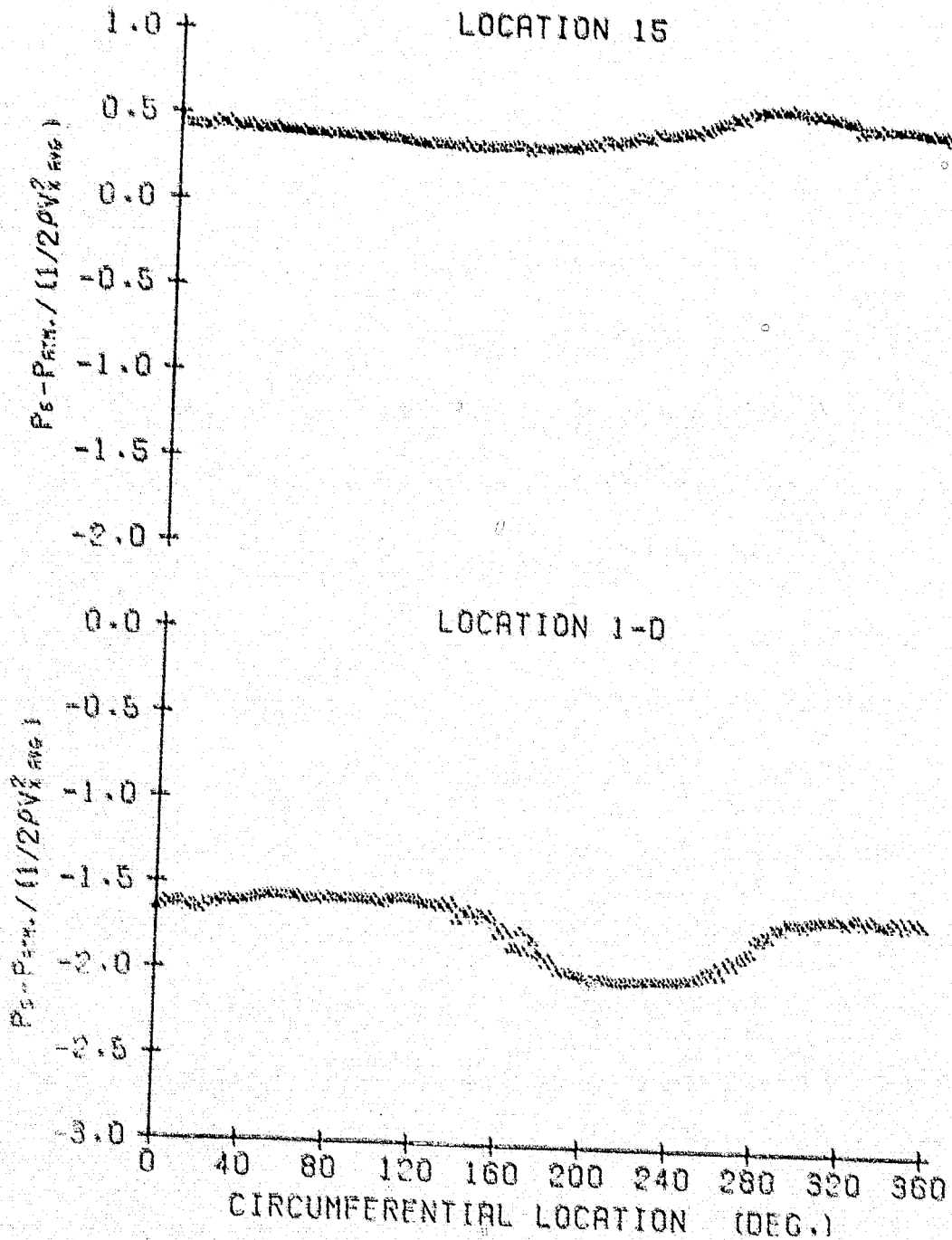


Figure F.65

10 October 1978
LCB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1833

AVG. FLOW COEF. = 0.523
AVG. P-RISE COEF. = 2.494
AVG. INCIDENCE = 6.09 DEG.

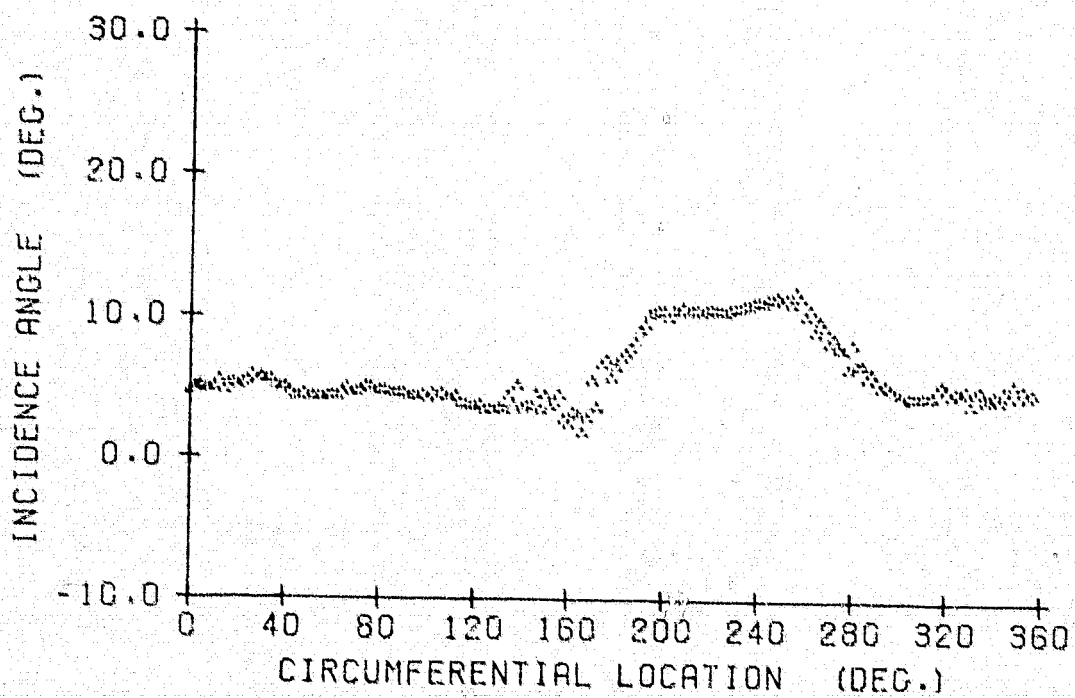


Figure F.66

10 October 1978
LCB:jep

9. BLADES
50 DEG. STAGGER ANGLE
50 DEG. SQ. DISTORTION
RPM = 1521

AVG. FLOW COEF. = 0.604
AVG. P-RISE COEF. = 1.360
AVG. INCIDENCE = 2.70 DEG.

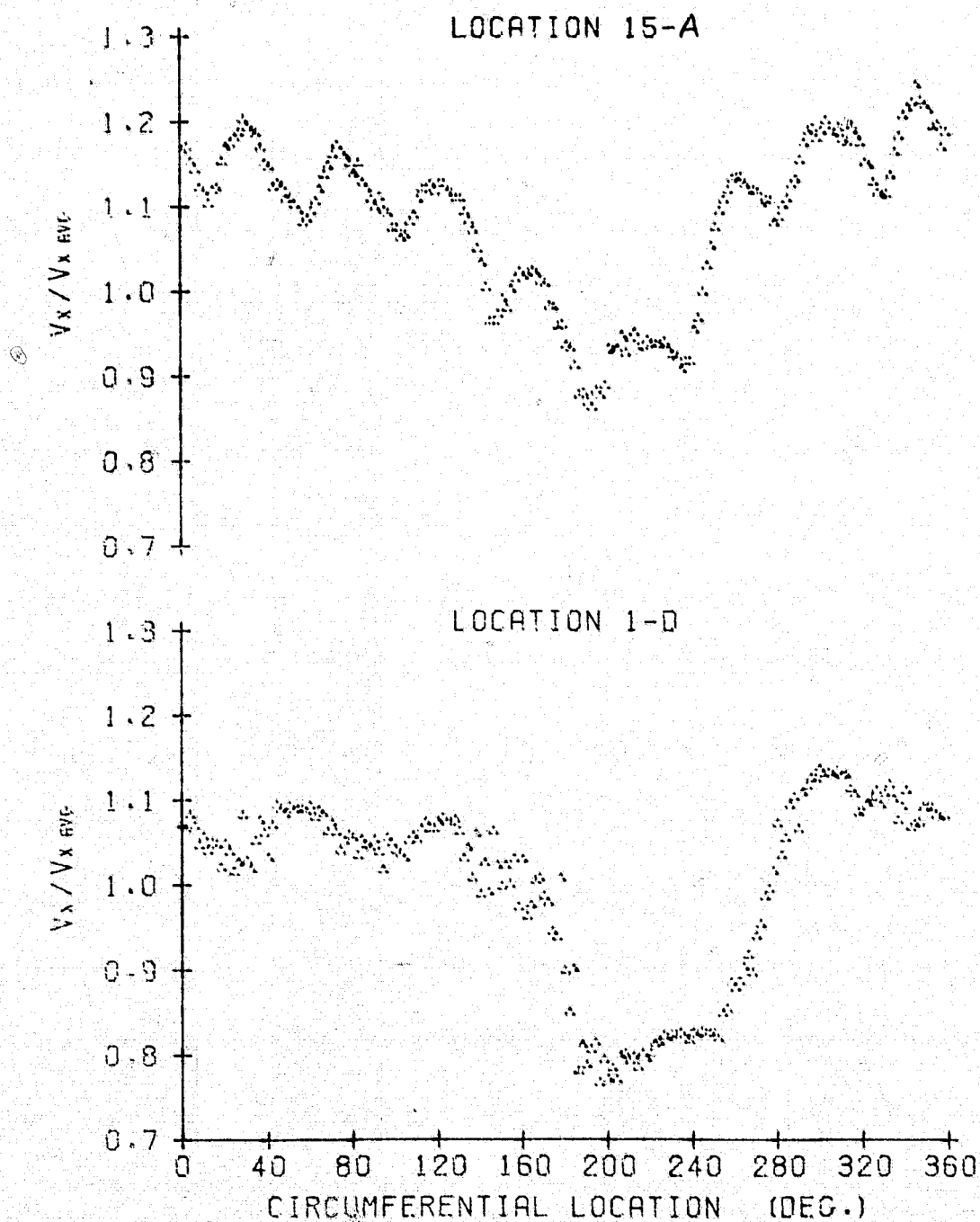


Figure F.67

3 BLADES
50 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1521

AVG. FLOW COEF. = 0.604
AVG. P-RISE COEF. = 1.360
AVG. INCIDENCE = 2.70 DEG.

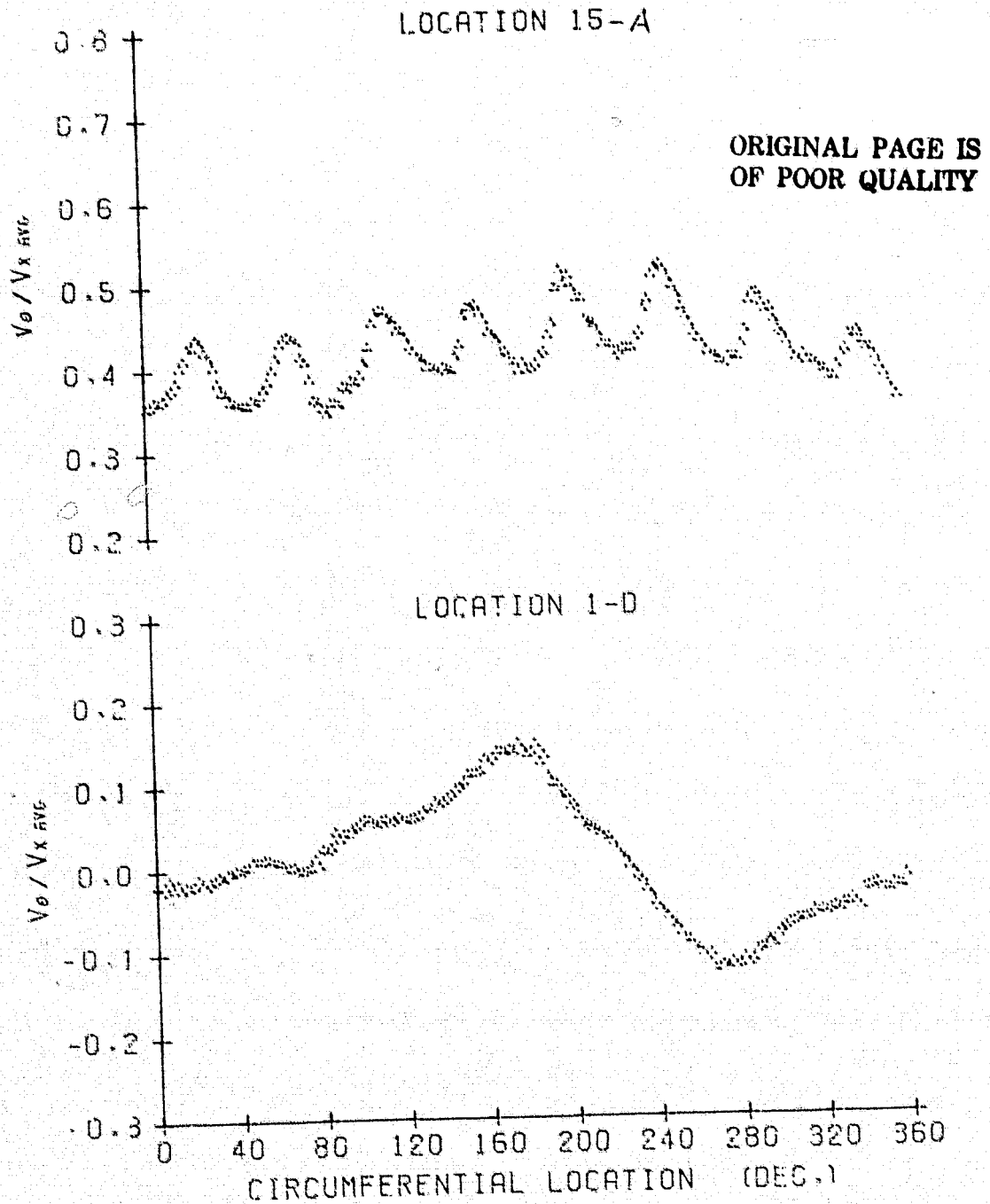


Figure F.68

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1521

AVG. FLOW COEF. = 0.604
AVG. P-RISE COEF. = 1.360
AVG. INCIDENCE = 2.70 DEG.

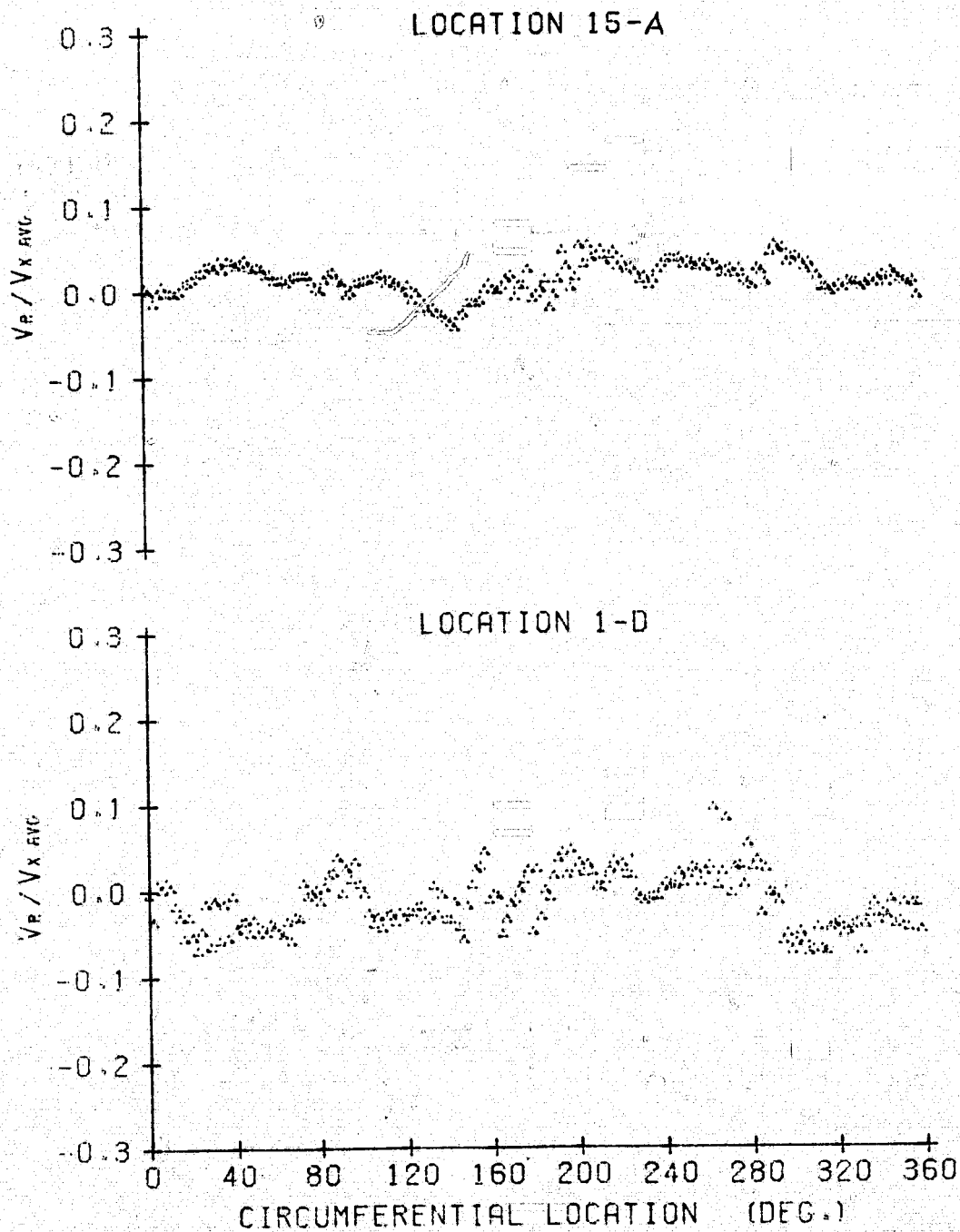


Figure F.69

10 October 1978
LCB:jep

0 BLADES
50 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1521

AVG. FLOW COEF. = 0.604
AVG. P-RISE COEF. = 1.360
AVG. INCIDENCE = 2.70 DEG.

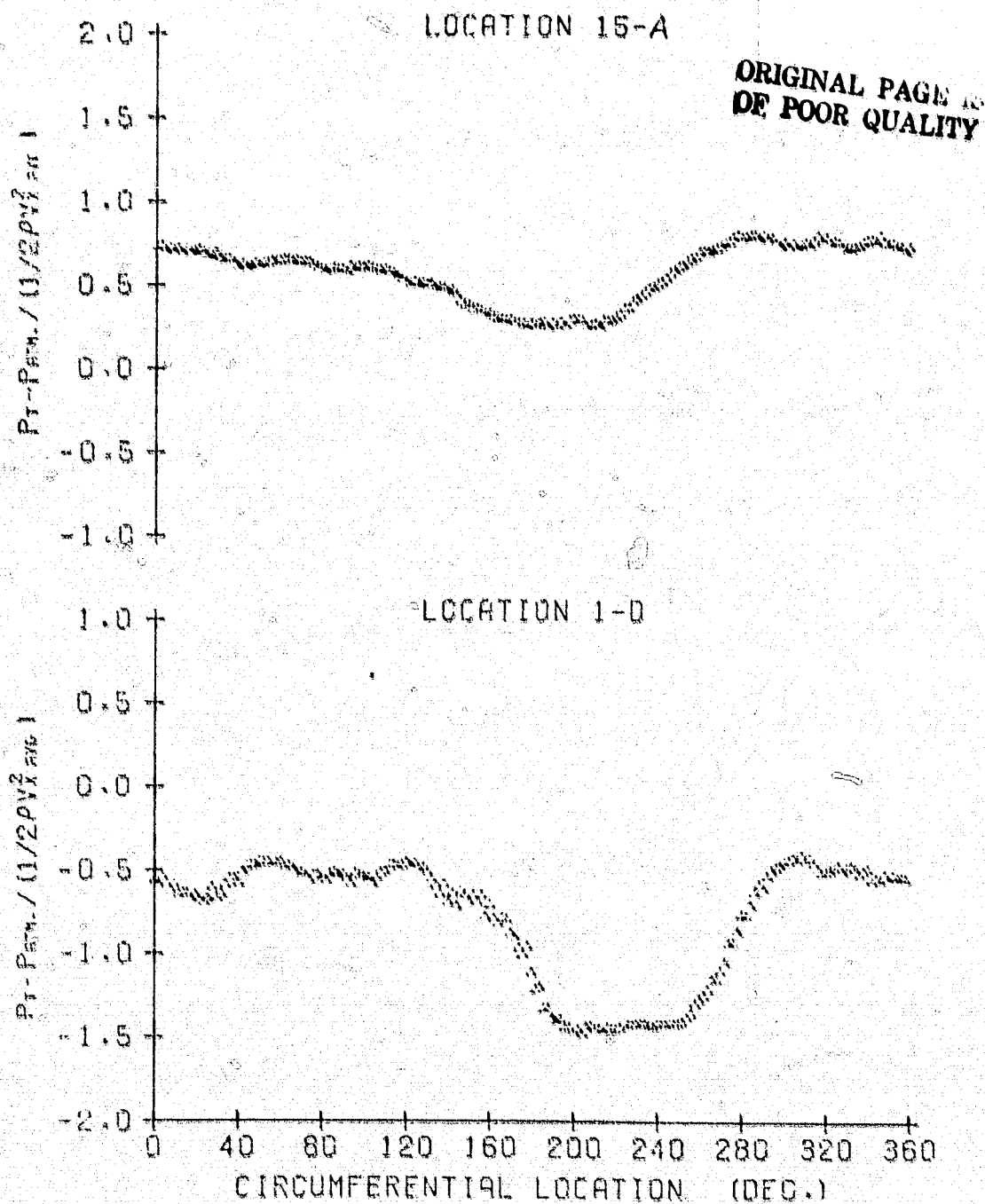


Figure F.70

10 October 1978
LCR:jep

3 BLADES

60 DEG. STAGGER ANGLE

90 DEG. SQ. DISTORTION

RPM = 1521

AVG. FLOW COEF. = 0.604

AVG. P-RISE COEF. = 1.360

AVG. INCIDENCE = 2.70 DEG.

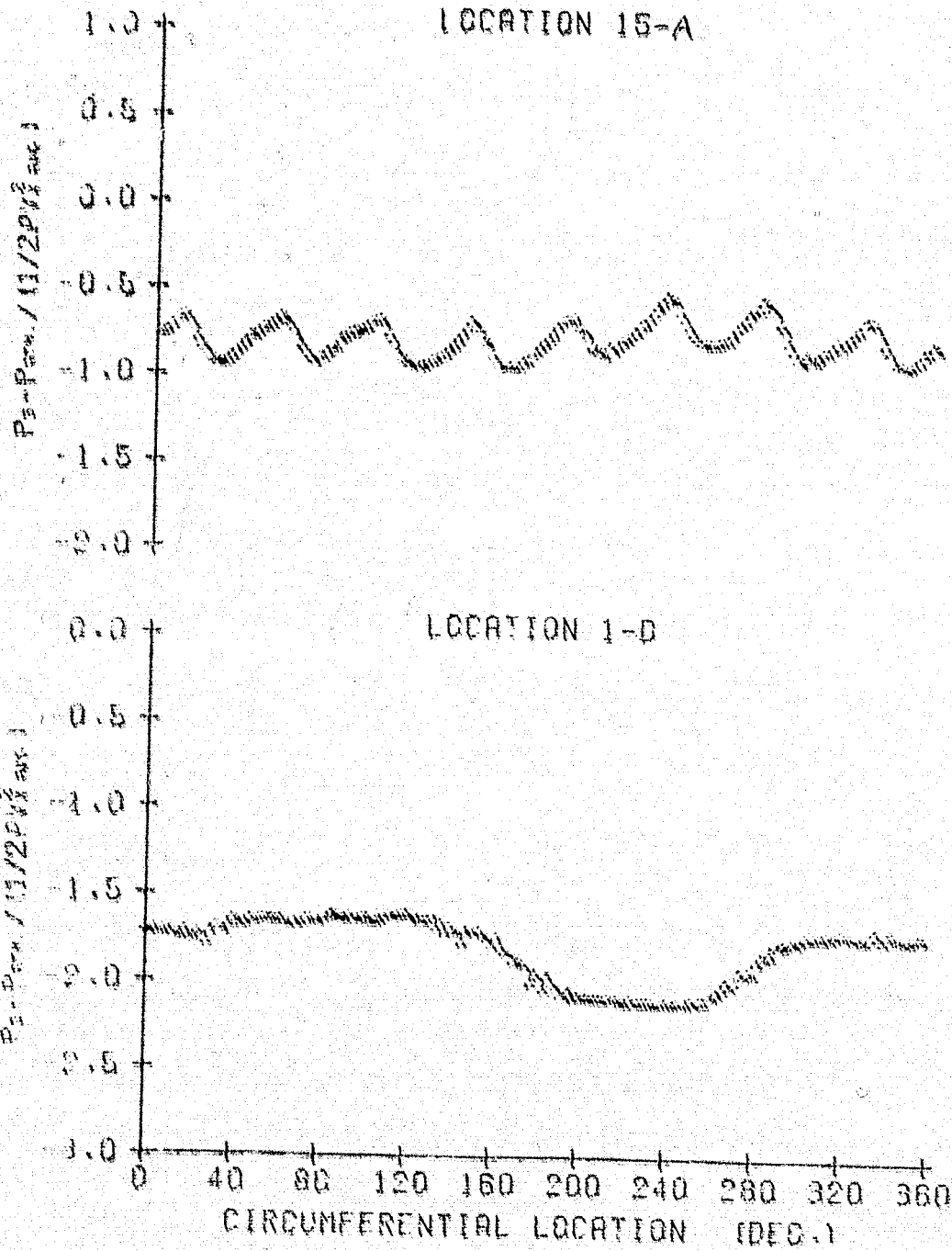


Figure F.71

10 October 1978
LCB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1521

AVG. FLOW COEF. = 0.604
AVG. P-RISE COEF. = 1.360
AVG. INCIDENCE = 2.70 DEG.

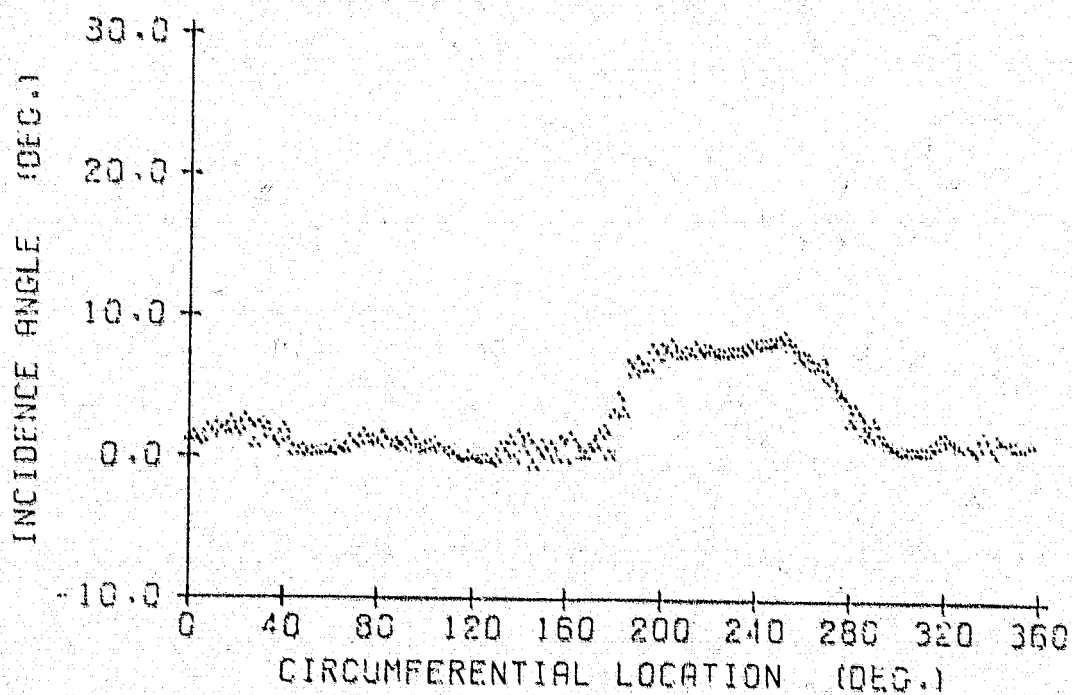


Figure F.72

10 October 1978
LCB:jep

9 BLADES
30 DEG. STAGGER ANGLE
30 DEG. SQ. DISTORTION
RPM = 1695

AVG. FLOW COEF. = 0.573
AVG. P-RISE COEF. = 1.796
AVG. INCIDENCE = 3.99 DEG.

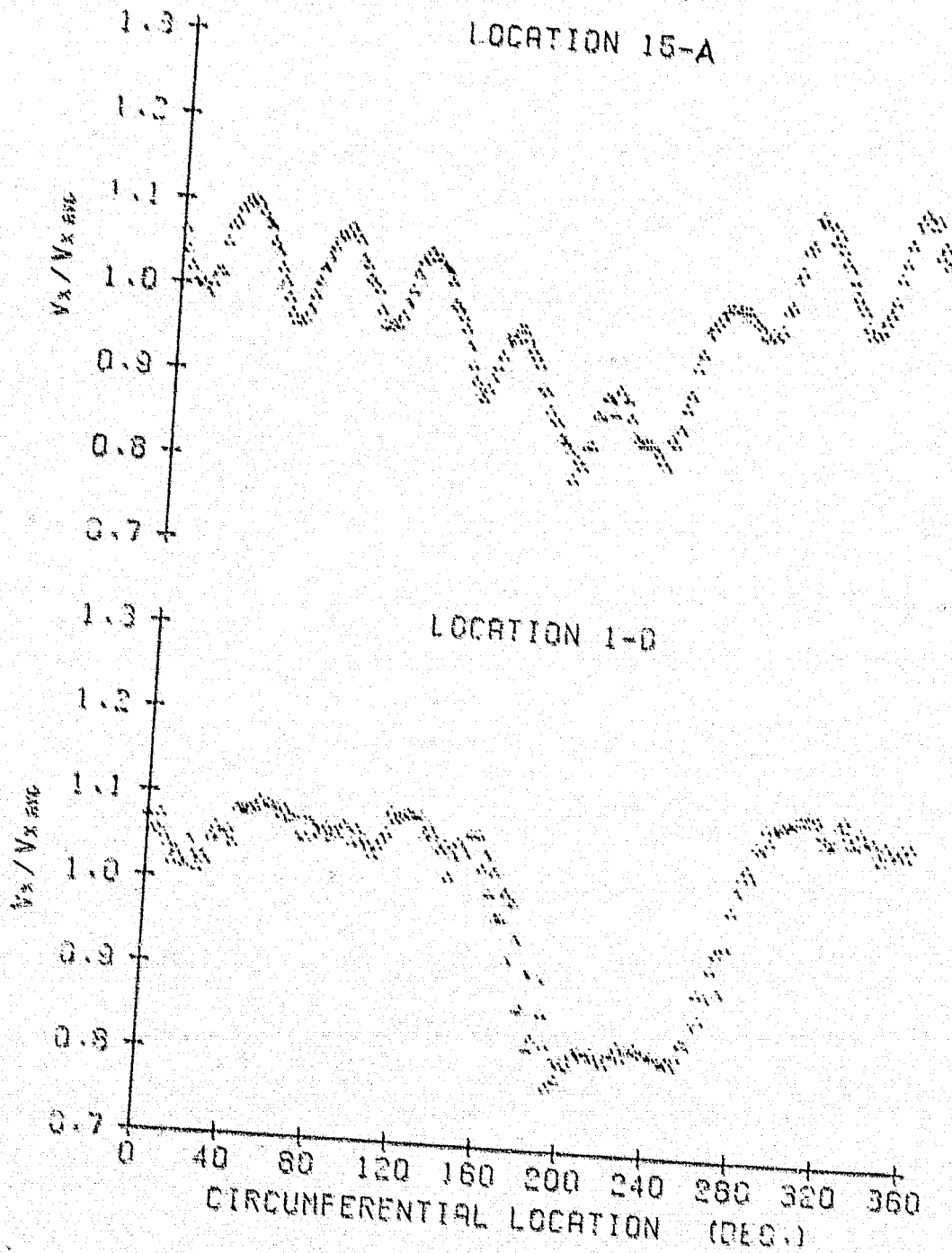


Figure F.73

10 October 1978
LCB:jep

3 BLADES
50 DEG. STAGGER ANGLE
50 DEG. SQ. DISTORTION
RPM = 1695

AVG. FLOW COEF. = 0.573
AVG. P-RISE COEF. = 1.796
AVG. INCIDENCE = 3.99 DEG.

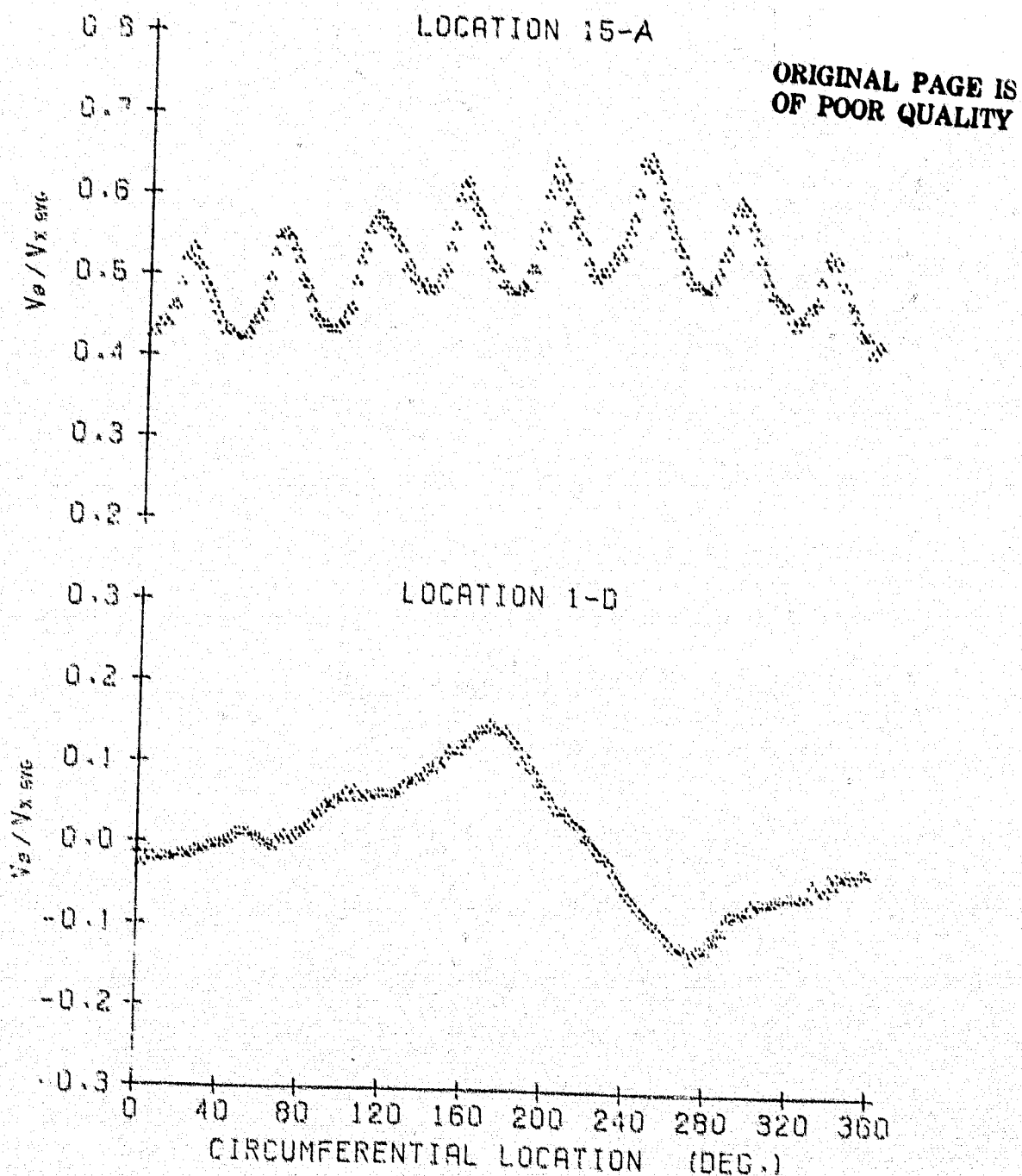


Figure F.74

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1695

AVG. FLOW COEF. = 0.573
AVG. P-RISE COEF. = 1.796
AVG. INCIDENCE = 3.99 DEG.

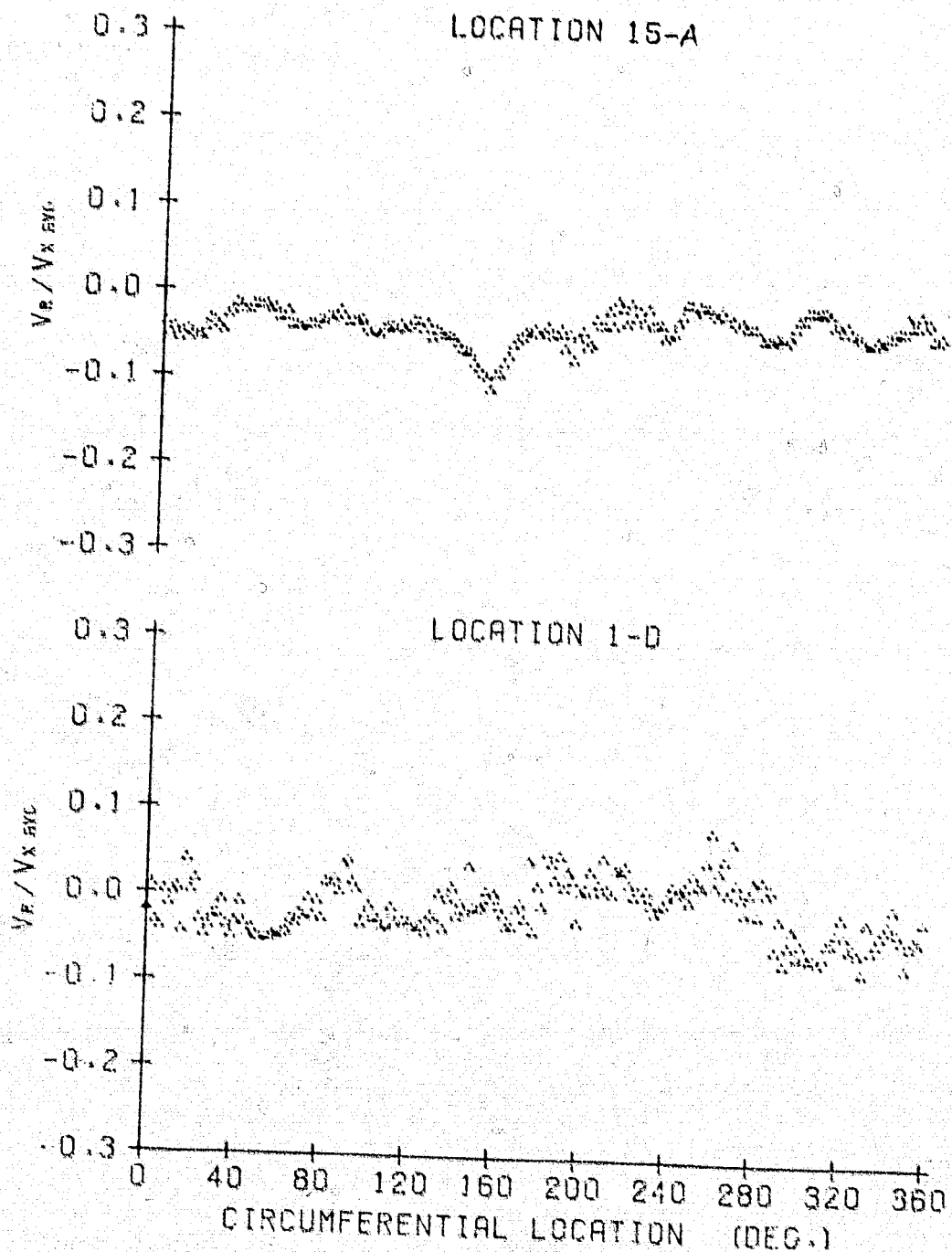


Figure F.75

10 October 1978

LCB:jep

3 BLADES

50 DEG STAGGER ANGLE

90 DEG. SQ. DISTORTION

RPM = 1695

AVG. FLOW COEF. = 0.573

AVG. P-RISE COEF. = 1.796

AVG. INCIDENCE = 3.99 DEG.

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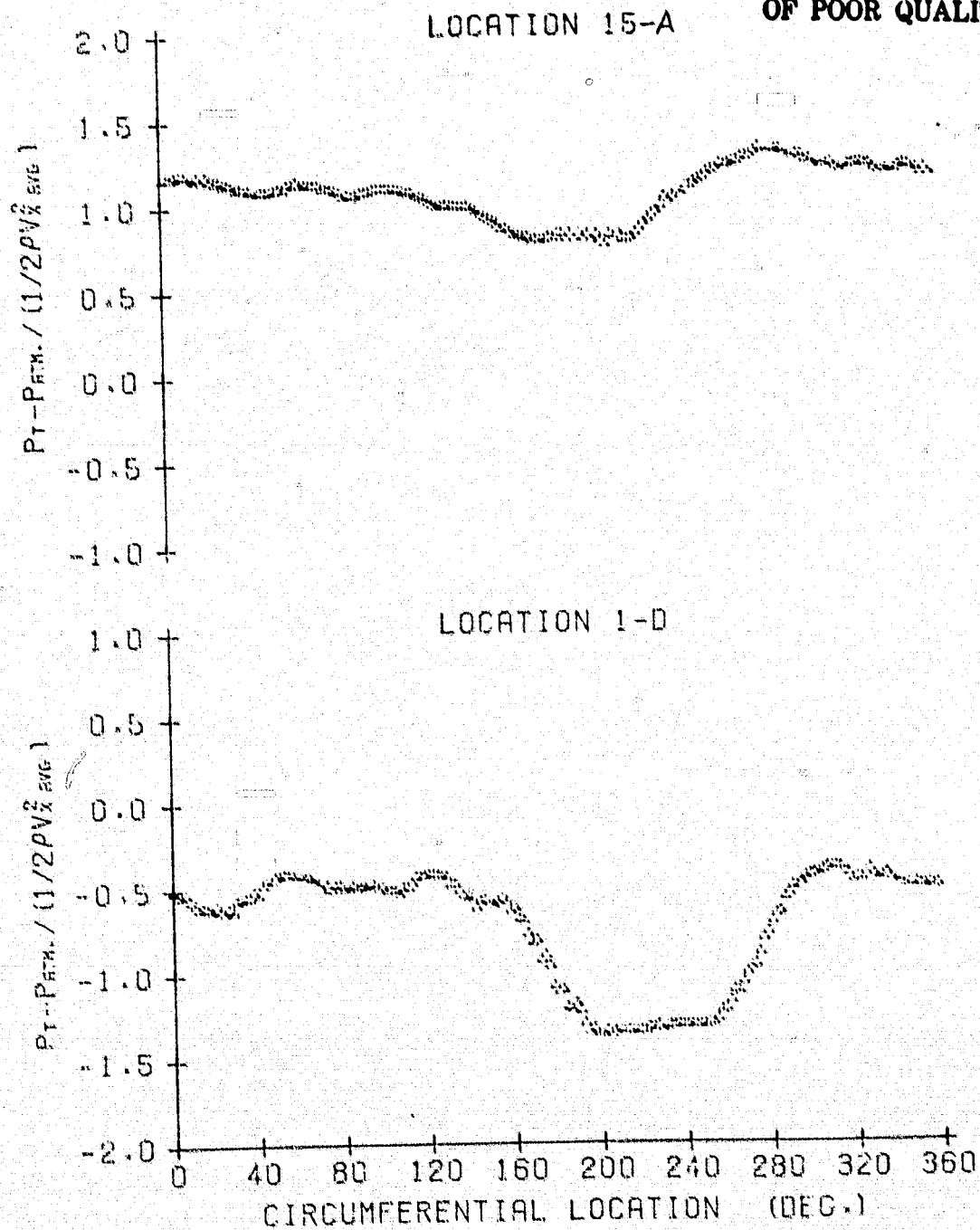


Figure F.76

10 October 1978
LCB:jep

3 BLADES
50 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1695

AVG. FLOW COEF. = 0.573
AVG. P-RISE COEF. = 1.796
AVG. INCIDENCE = 3.99 DEG.

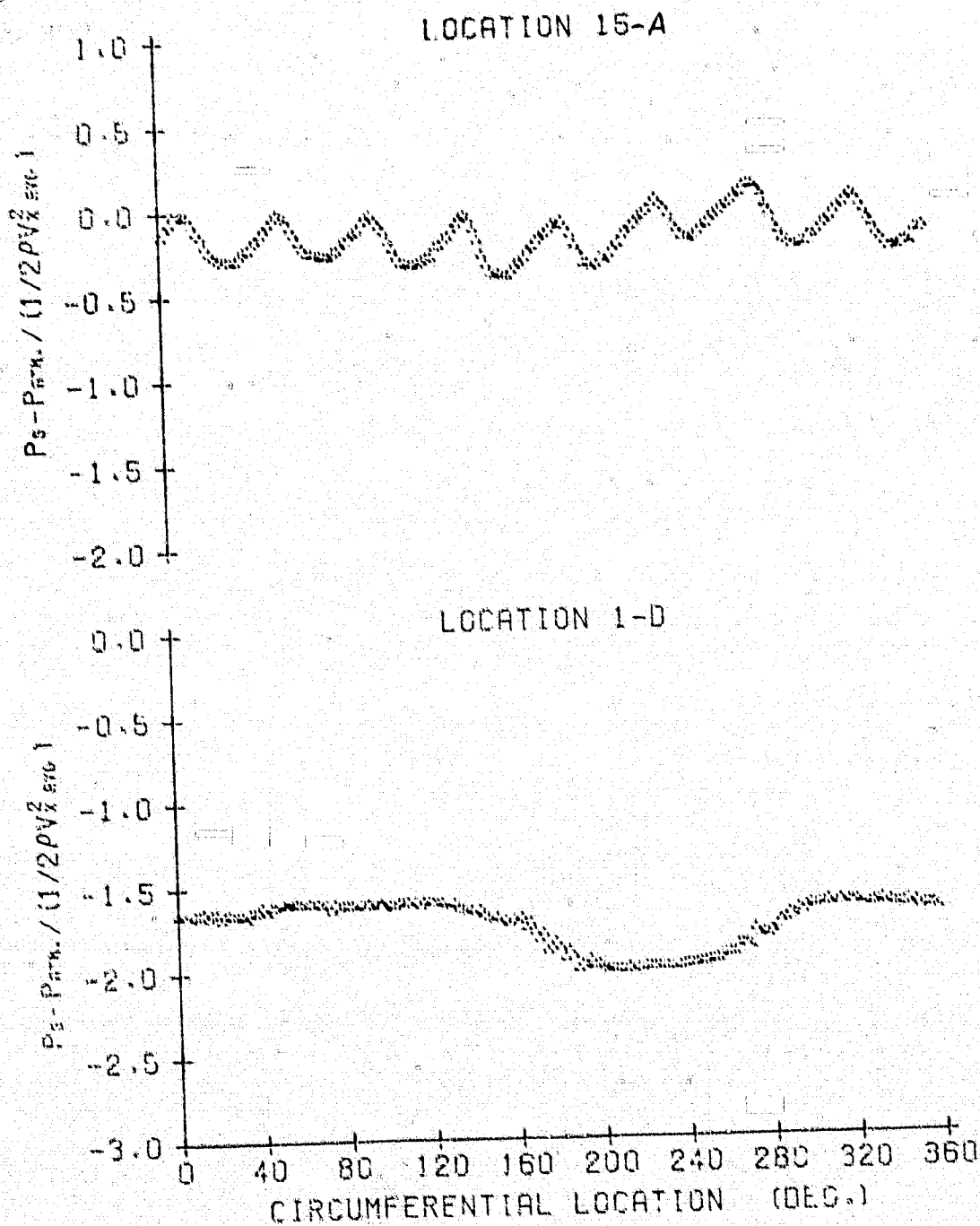


Figure F.77

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10 October 1978
LCB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1695

AVG. FLOW COEF. = 0.573
AVG. P-RISE COEF. = 1.796
AVG. INCIDENCE = 3.99 DEG.

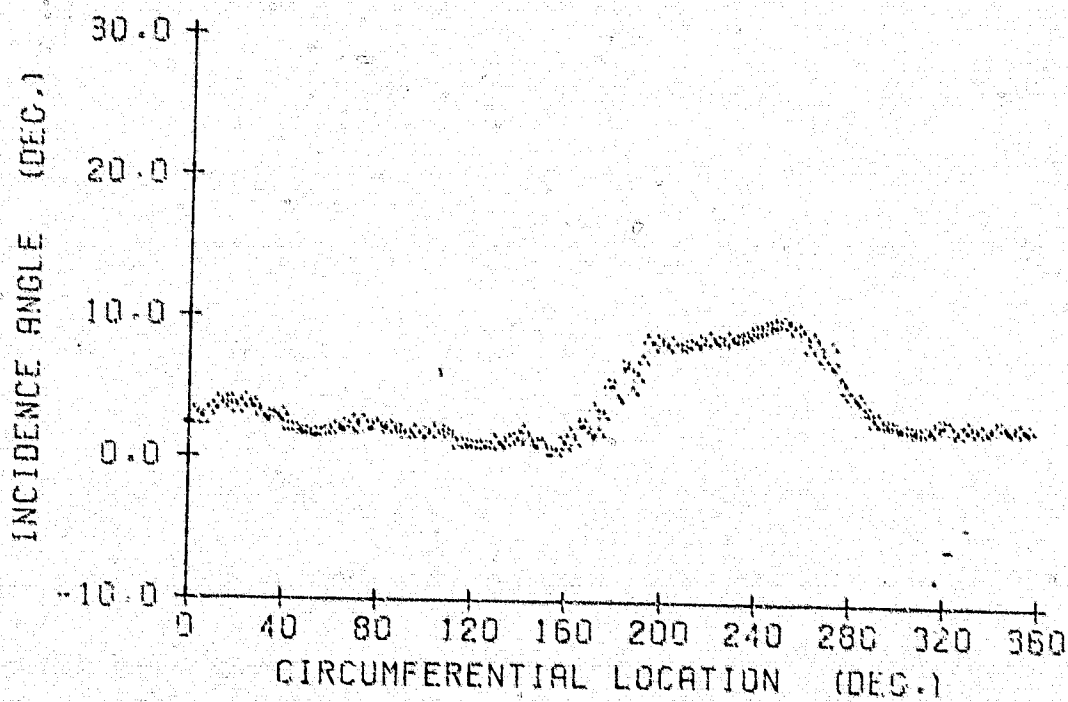


Figure F.78

10 October 1978
LCB:jep

9 BLADES

50 DEG. STAGGER ANGLE

50 DEG. SQ. DISTORTION

RPM = 1833

AVG. FLOW COEF. = 0.522

AVG. P-RISE COEF. = 2.482

AVG. INCIDENCE = 6.28 DEG.

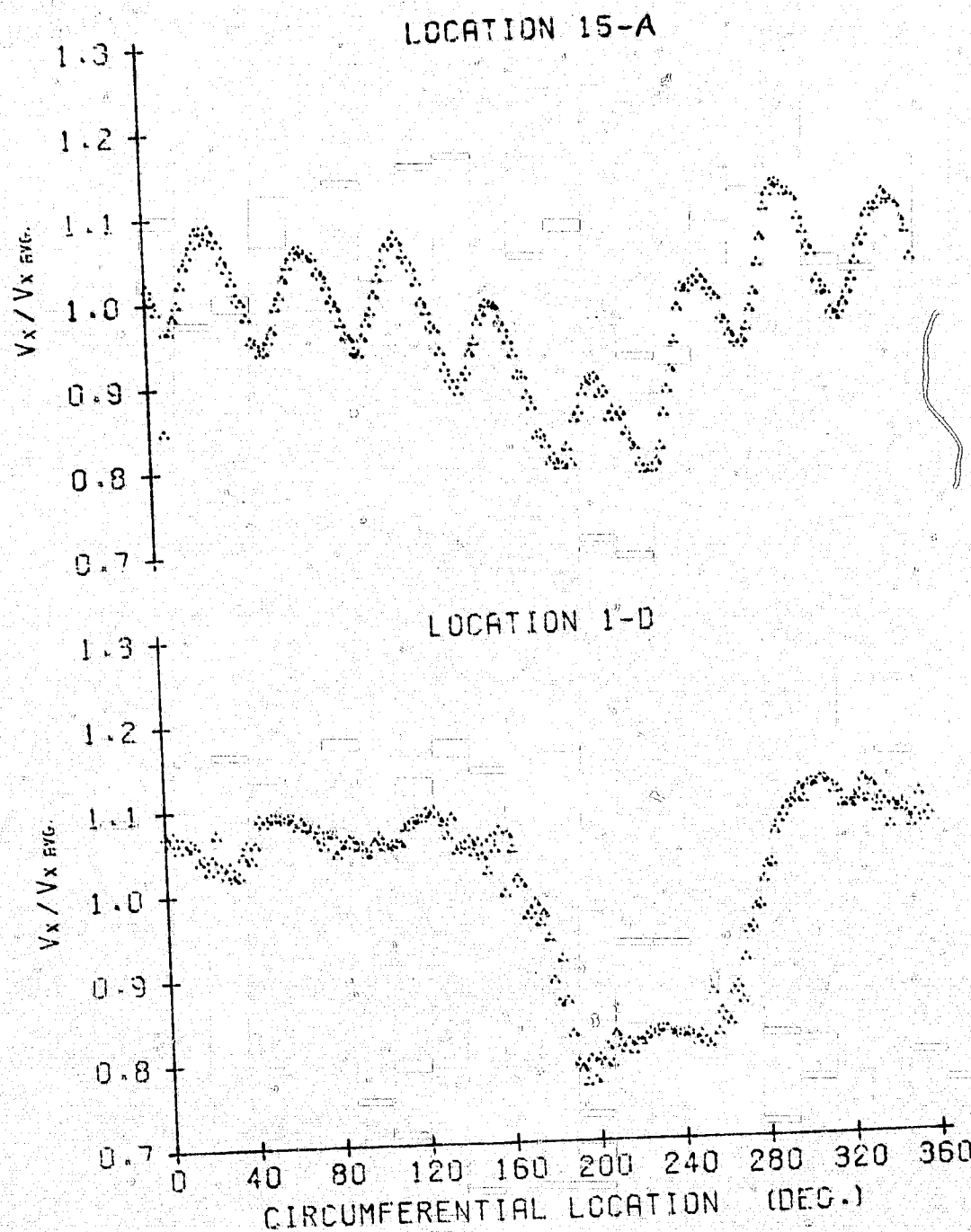


Figure F.79

10 October 1978
LCB:jep

6 BLADES
50 DEG. STAGGER ANGLE
30 DEG. SQ. DISTORTION
RPM : 1833

AVG. FLOW COEF. = 0.522
AVG. P-RISE COEF. = 2.482
AVG. INCIDENCE = 6.28 DEG.

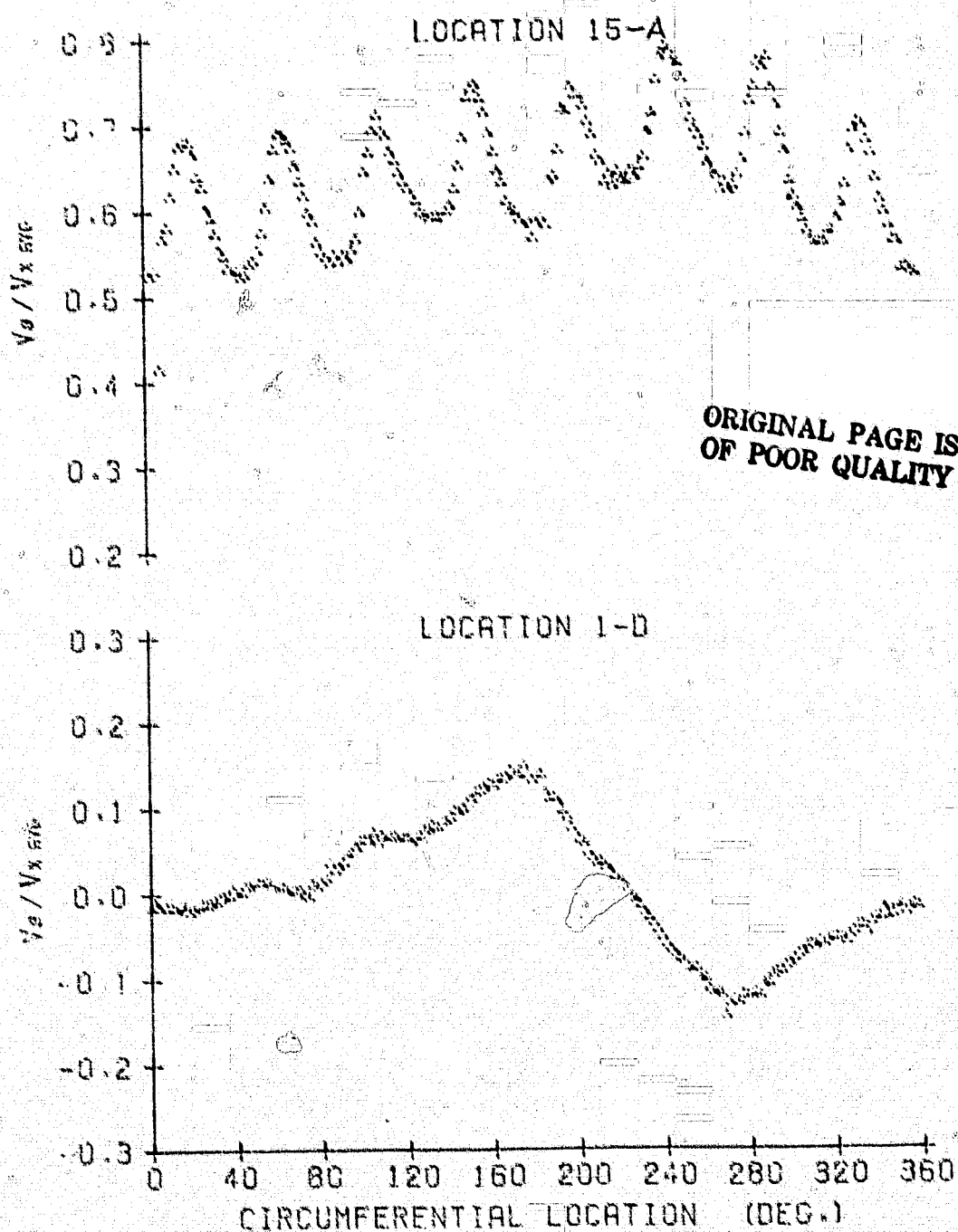


Figure F.80

10 October 1978
LCB:jep

9° BLADES
50 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1833

AVG. FLOW COEF. = 0.522
AVG. P-RISE COEF. = 2.482
AVG. INCIDENCE = 6.28 DEG.

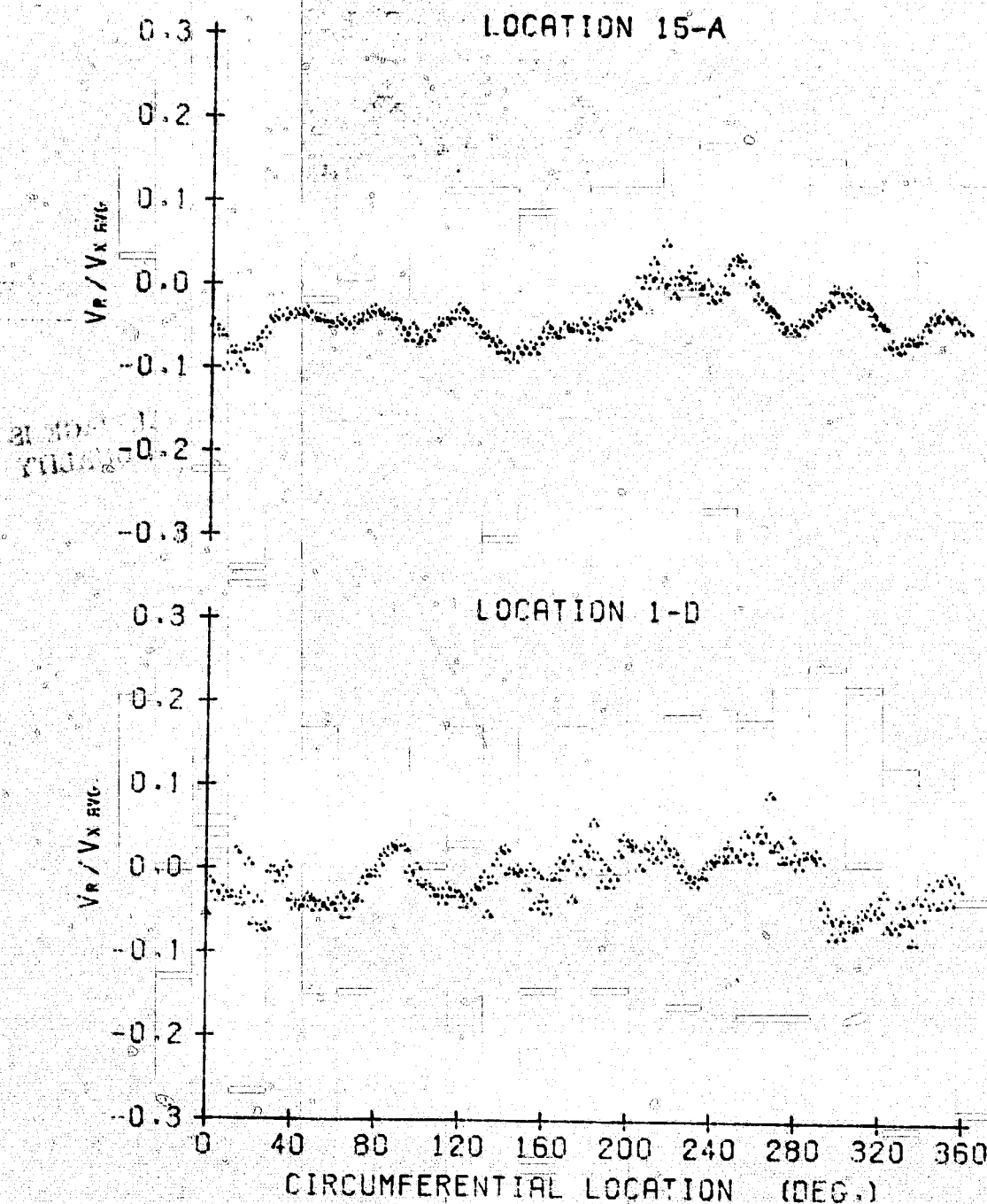


Figure F.81

9 BLADES

AVG. FLOW COEF. = 0.522

50 DEG. STAGGER ANGLE

AVG. P-RISE COEF. = 2.482

90 DEG. SQ. DISTORTION

AVG. INCIDENCE = 6.28 DEG.

RPM = 1833

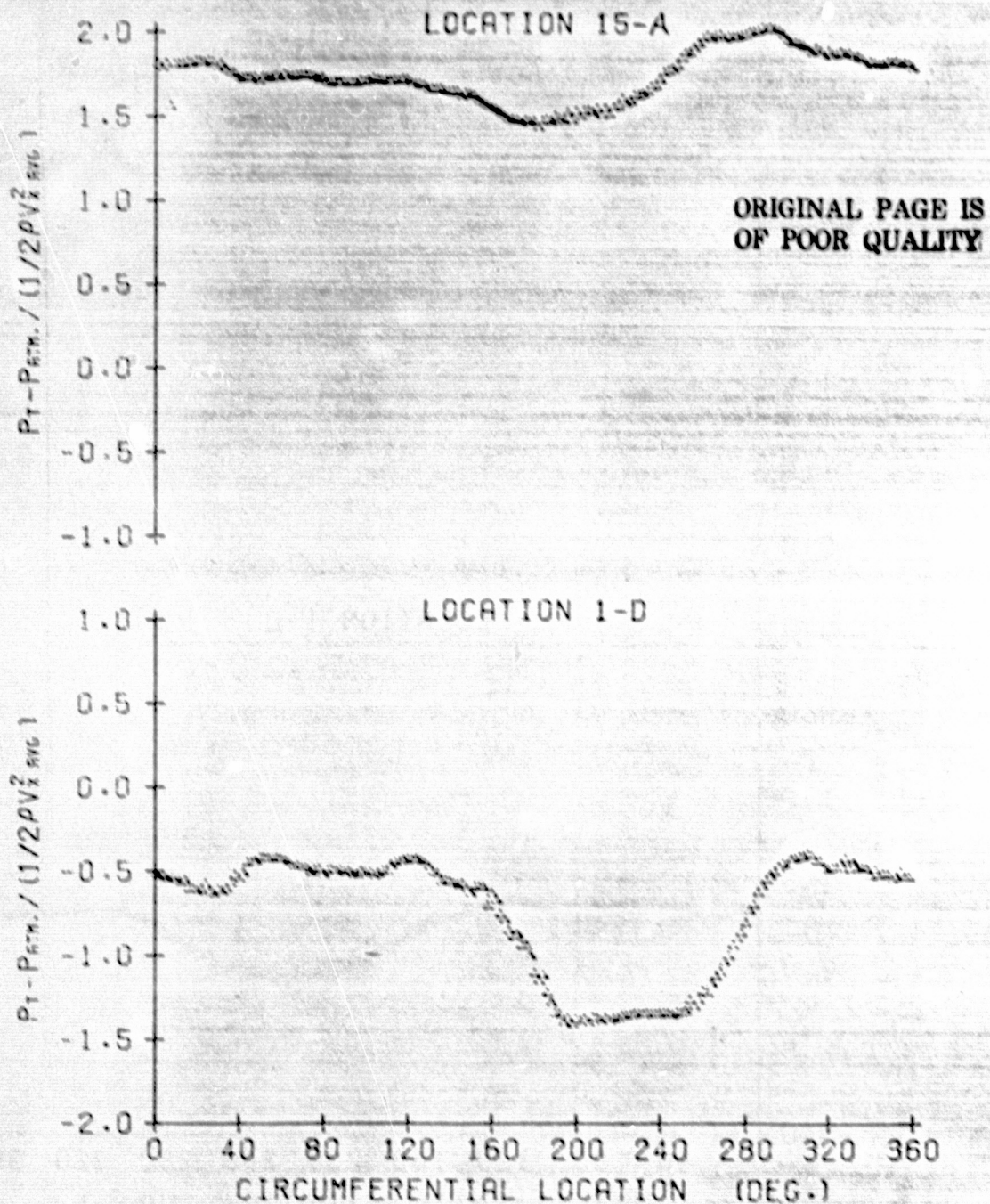


Figure F.82

10 October 1978

LCB:jep

9 BLADES

50 DEG. STAGGER ANGLE

90 DEG. SQ. DISTORTION

RPM = 1833

AVG. FLOW COEF. = 0.522

AVG. P-RISE COEF. = 2.482

AVG. INCIDENCE = 6.28 DEG.

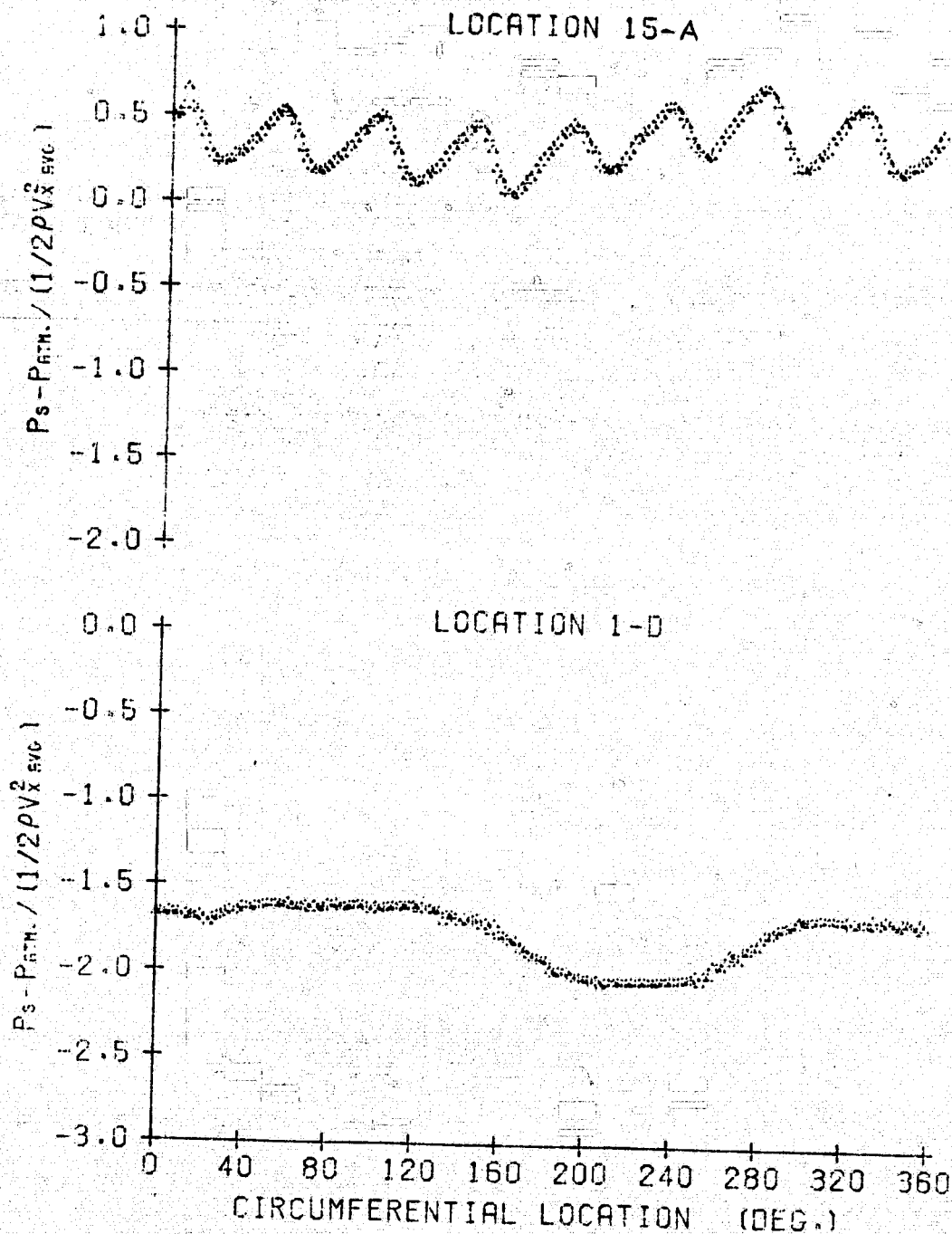


Figure F.83

10 October 1978
LCB:jap

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9 BLADES
50 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1839

AVG. FLOW COEF. = 0.522
AVG. P-RISE COEF. = 2.482
AVG. INCIDENCE = 6.28 DEG.

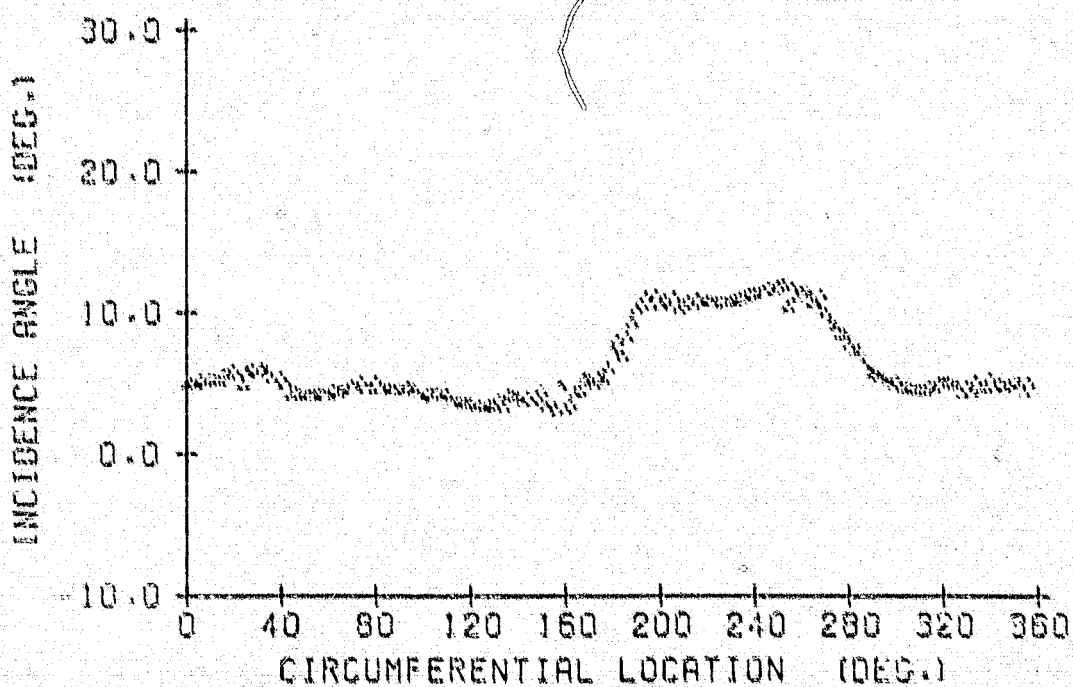


Figure F.84

10 October 1978

LCB:jep

9 BLADES
 50 DEG. STAGGER ANGLE
 90 DEG. SQ. DISTORTION
 RPM = 1695

AVG. FLOW COEF. = 0.531
 AVG. P-RISE COEF. = 2.255
 AVG. INCIDENCE = 5.86 DEG.

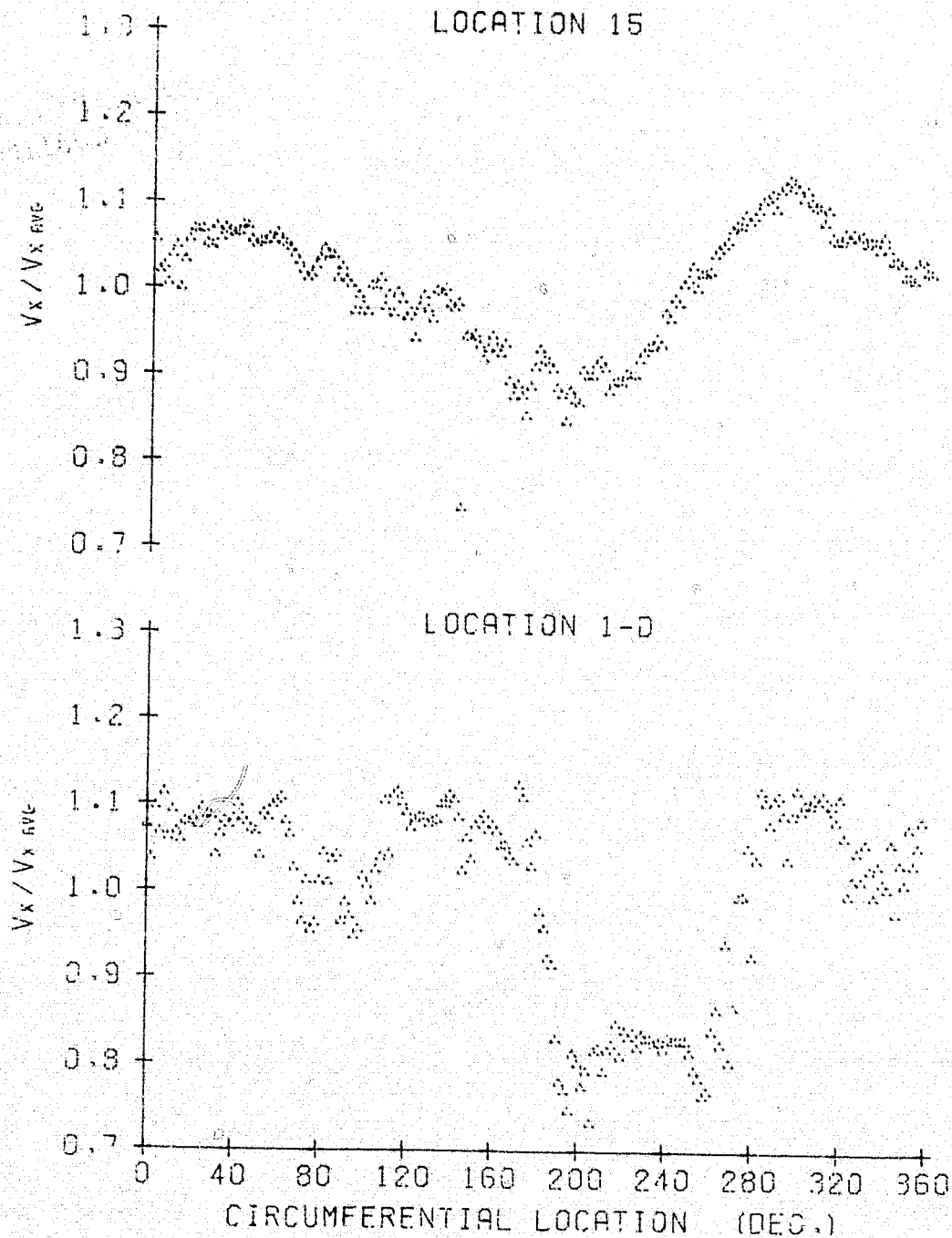


Figure F.85

10 October 1978

LCB:jep

9 BLADES

50 DEG. STAGGER ANGLE

90 DEG. SQ. DISTORTION

RPM = 1695

AVG. FLOW COEF. = 0.531

AVG. P-RISE COEF. = 2.255

AVG. INCIDENCE = 5.86 DEG.

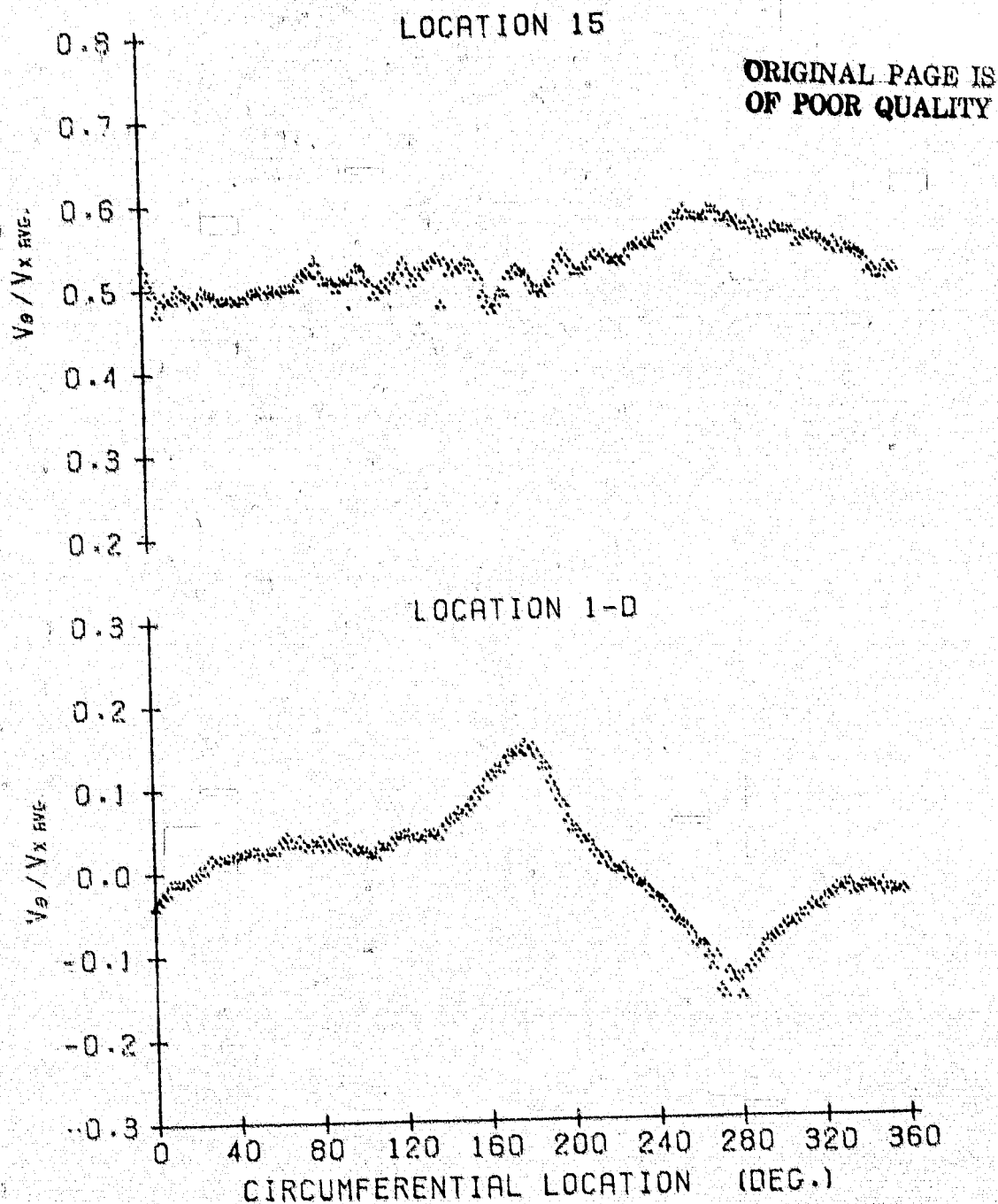


Figure F.86

10 October 1978
LCB:jep

9 BLADES
90 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1695

AVG. FLOW COEF. = 0.531
AVG. P-RISE COEF. = 2.255
AVG. INCIDENCE = 5.86 DEG.

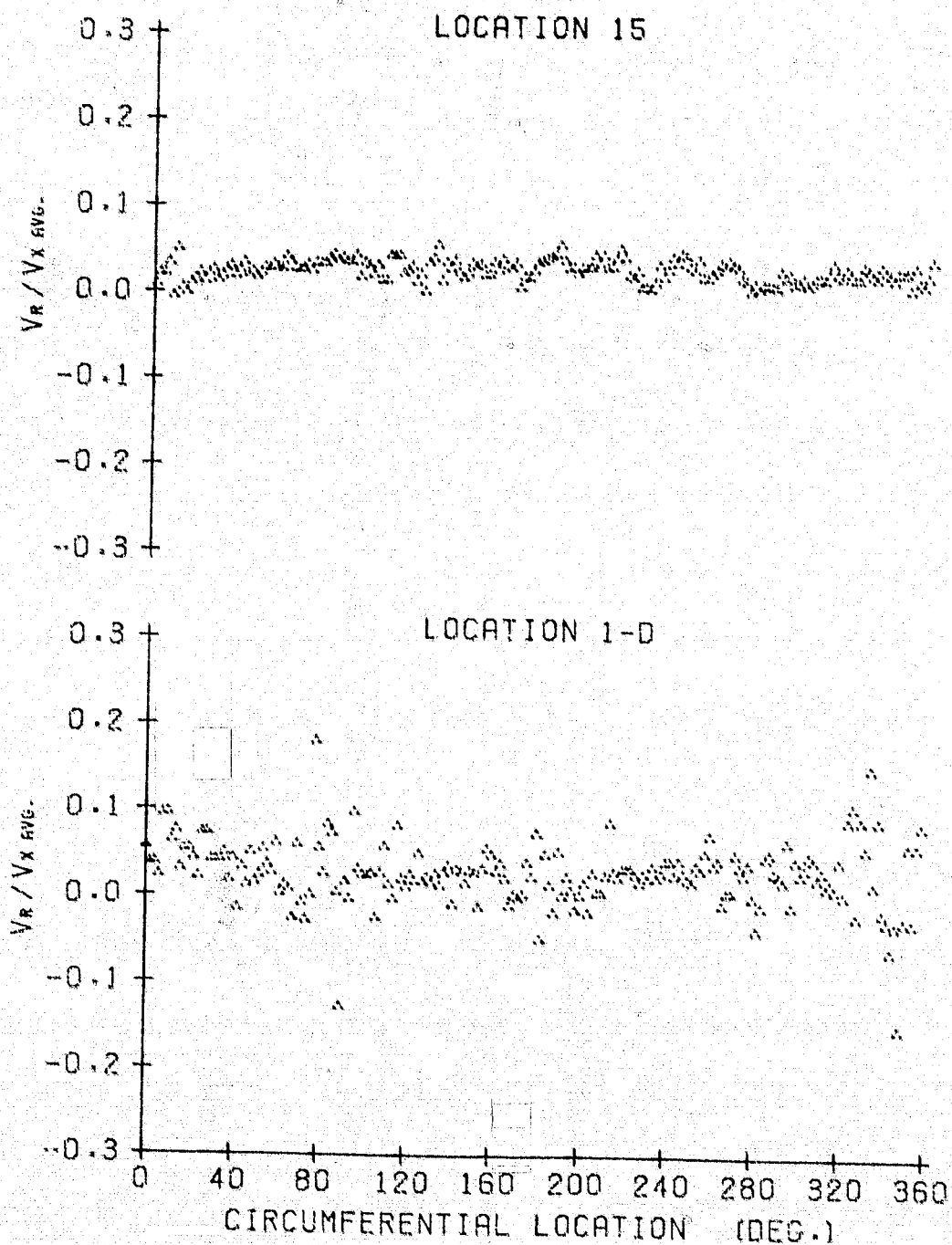


Figure F.87

10 October 1978

LCB:jep

9 BLADES
 50 DEG. STAGGER ANGLE
 90 DEG. SQ. DISTORTION
 RPM = 1695

AVG. FLOW COEF. = 0.531
 AVG. P-RISE COEF. = 2.255
 AVG. INCIDENCE = 5.86 DEG.

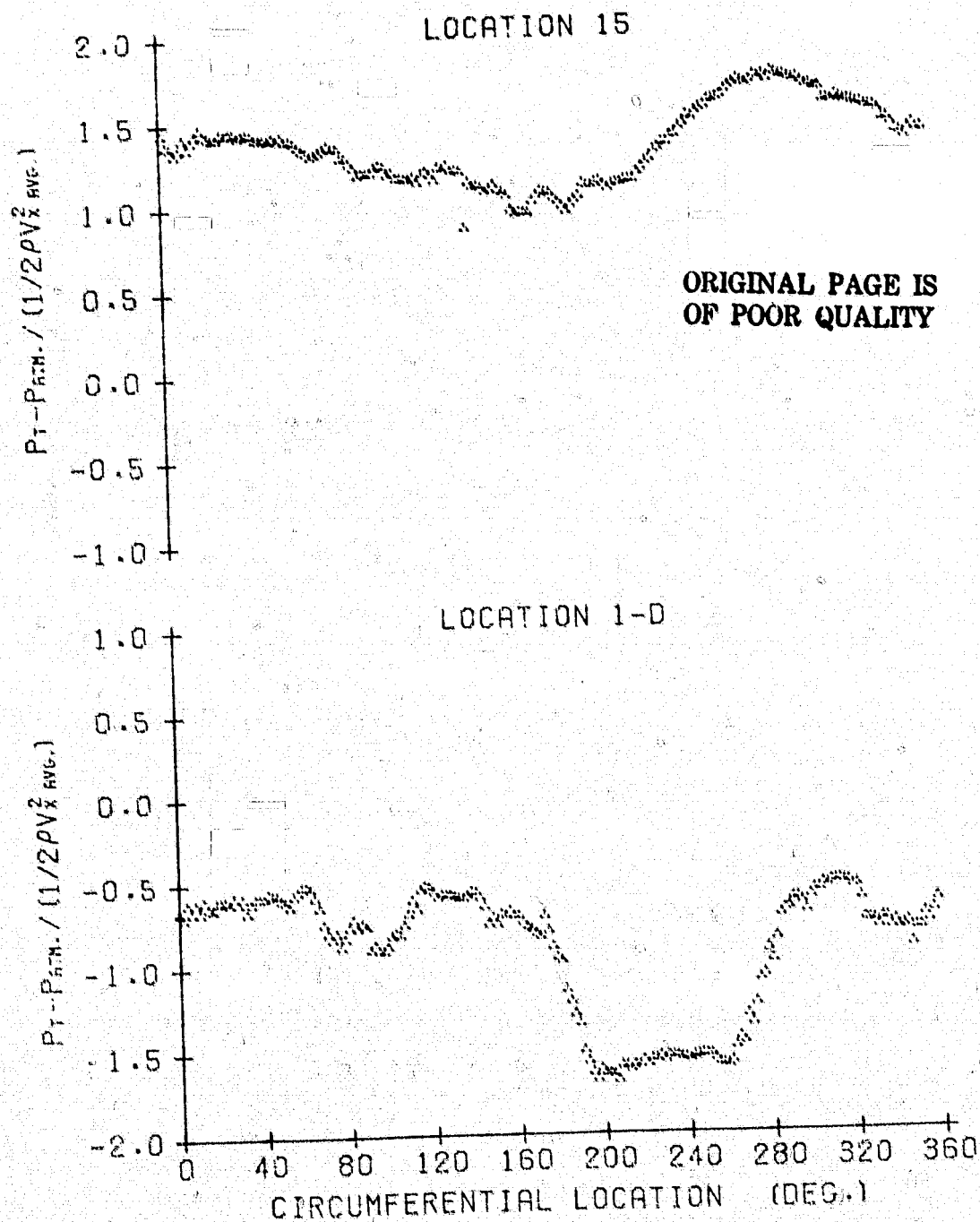


Figure F.88

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1695

AVG. FLOW COEF. = 0.531
AVG. P-RISE COEF. = 2.255
AVG. INCIDENCE = 5.86 DEG.

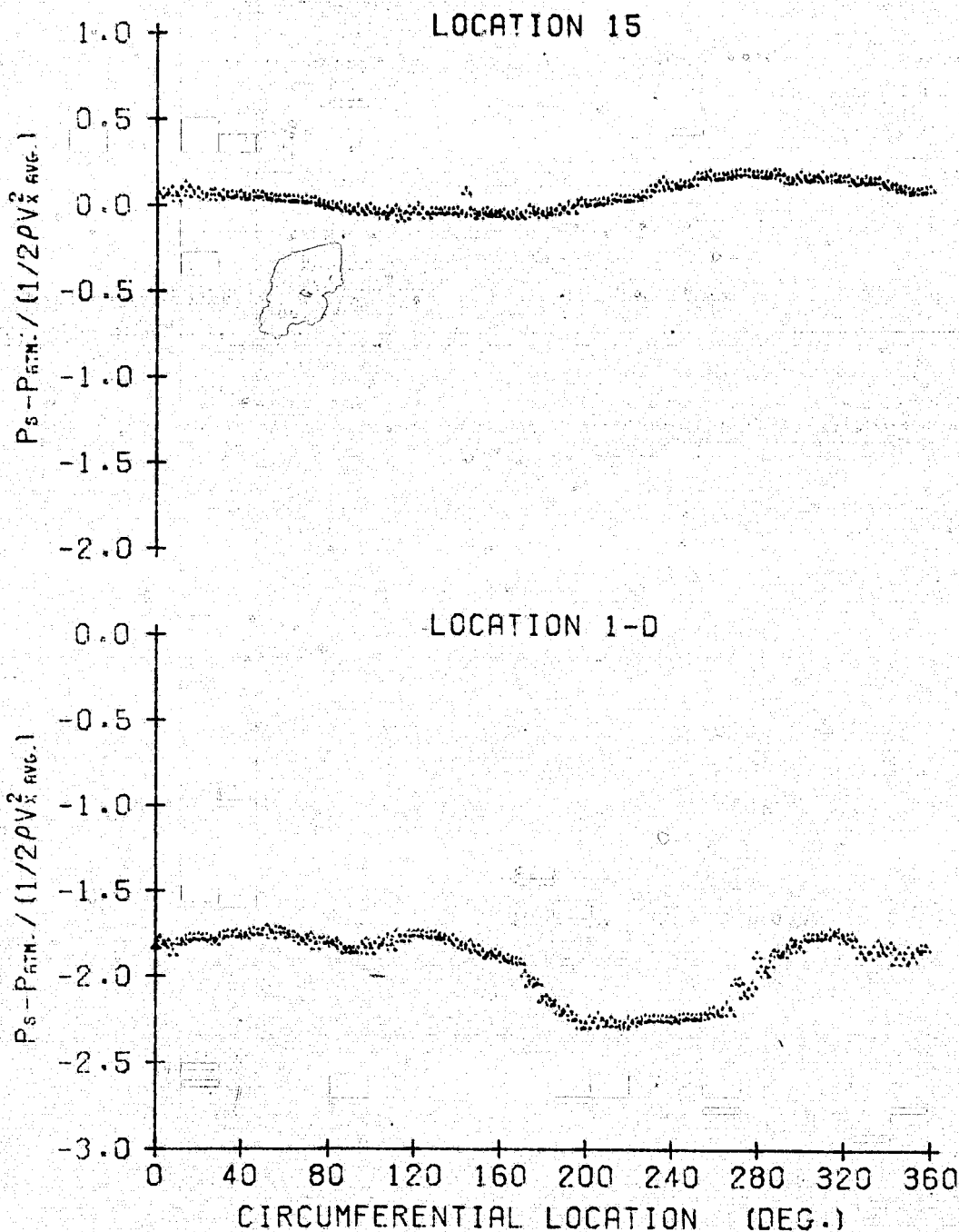


Figure F.89

10 October 1978

LCB:jep

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9 BLADES

50 DEG. STAGGER ANGLE

90 DEG. SQ. DISTORTION

RPM = 1695

AVG. FLOW COEF. = 0.531

AVG. P-RISE COEF. = 2.255

AVG. INCIDENCE = 5.86 DEG.

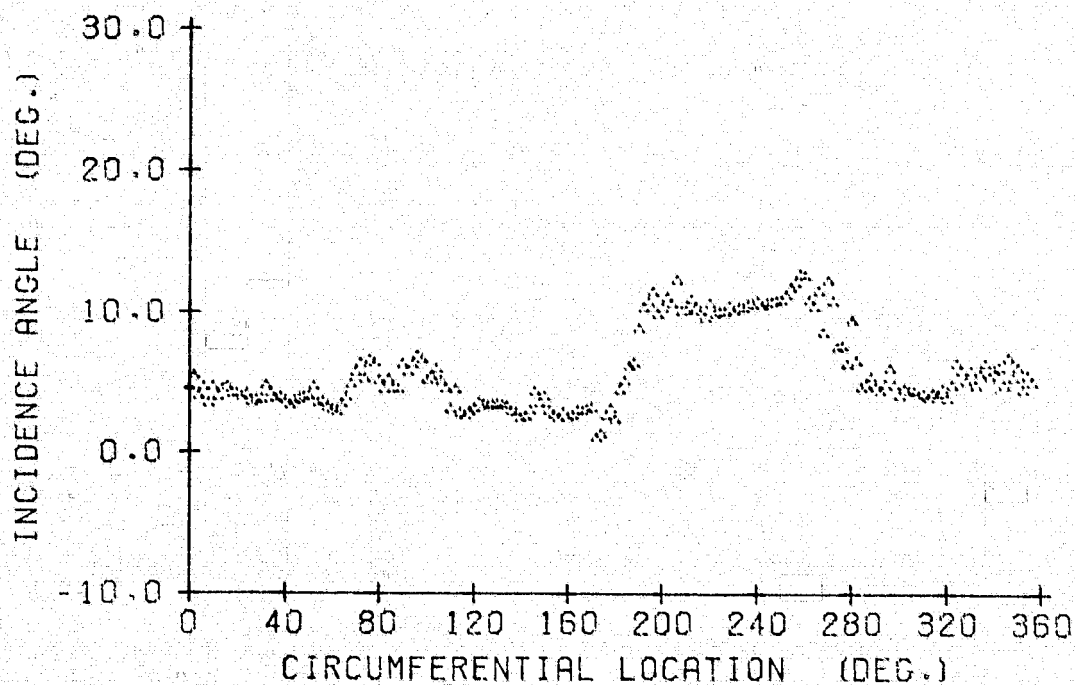


Figure F.90

10 October 1978

LCB:jep

9 BLADES

50 DEG. STAGGER ANGLE

90 DEG. SQ. DISTORTION

RPM = 1695

AVG. FLOW COEF. = 0.540

AVG. P-RISE COEF. = 2.118

AVG. INCIDENCE = 5.53 DEG.

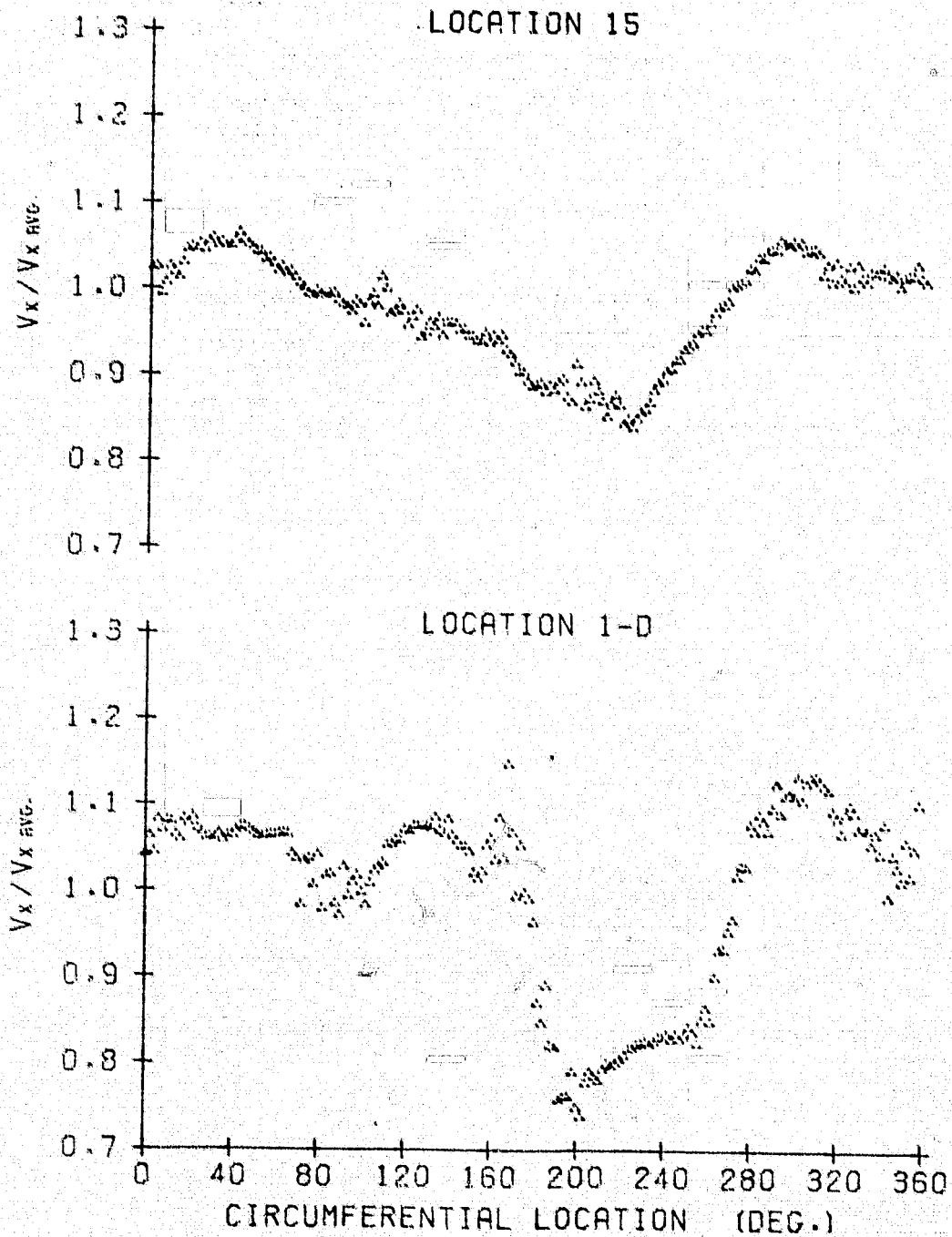


Figure F.91

10 October 1978
LCB:jep

9 BLADES

50 DEG. STAGGER ANGLE

90 DEG. SQ. DISTORTION

RPM = 1695

AVG. FLOW COEF. = 0.540

AVG. P-RISE COEF. = 2.118

AVG. INCIDENCE = 5.53 DEG.

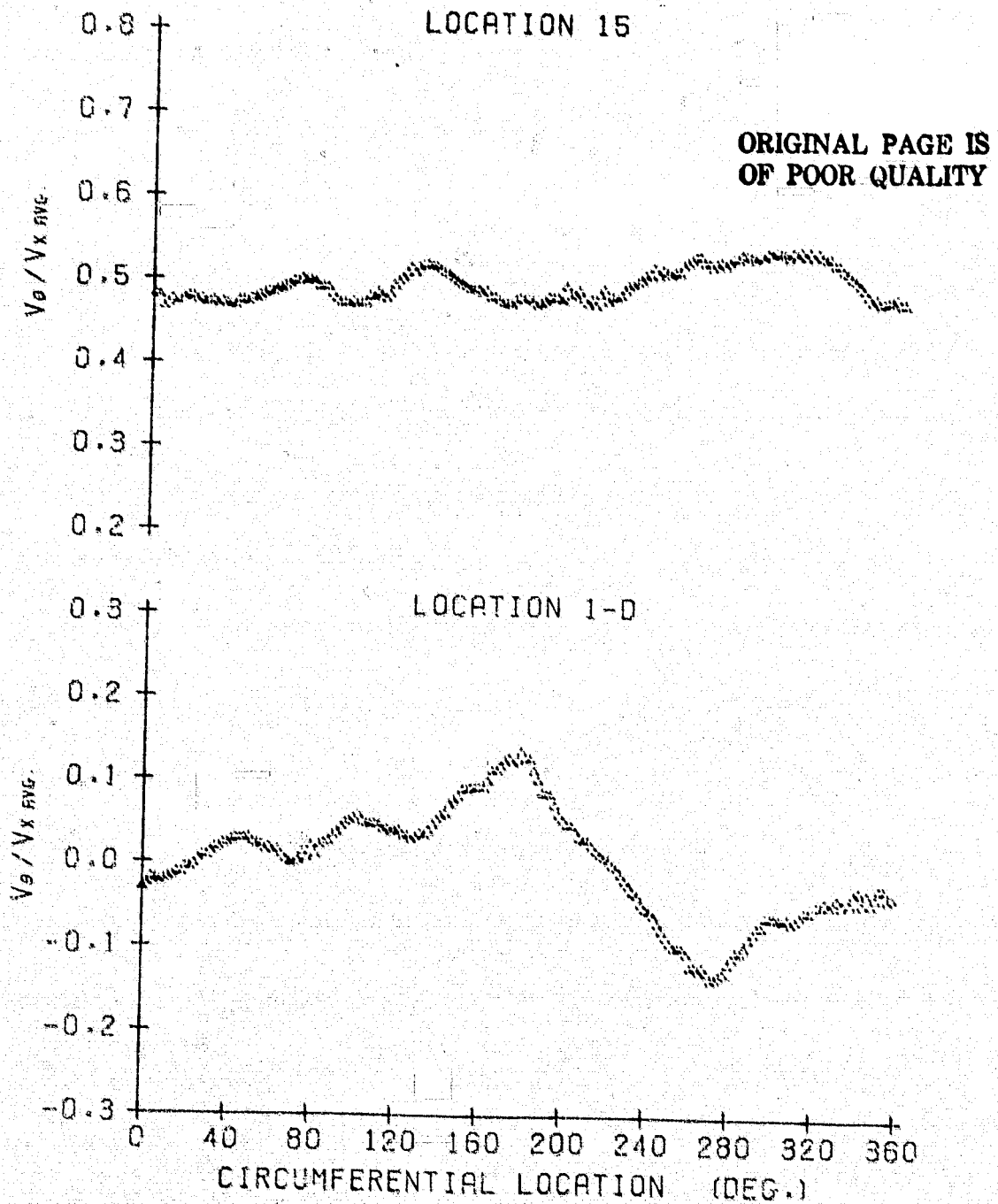


Figure F.92

10 October 1978

LCB:jep

9 BLADES

AVG. FLOW COEF. = 0.540

50 DEG. STAGGER ANGLE

AVG. P-RISE COEF. = 2.118

90 DEG. SQ. DISTORTION

AVG. INCIDENCE = 5.53 DEG.

RPM = 1695

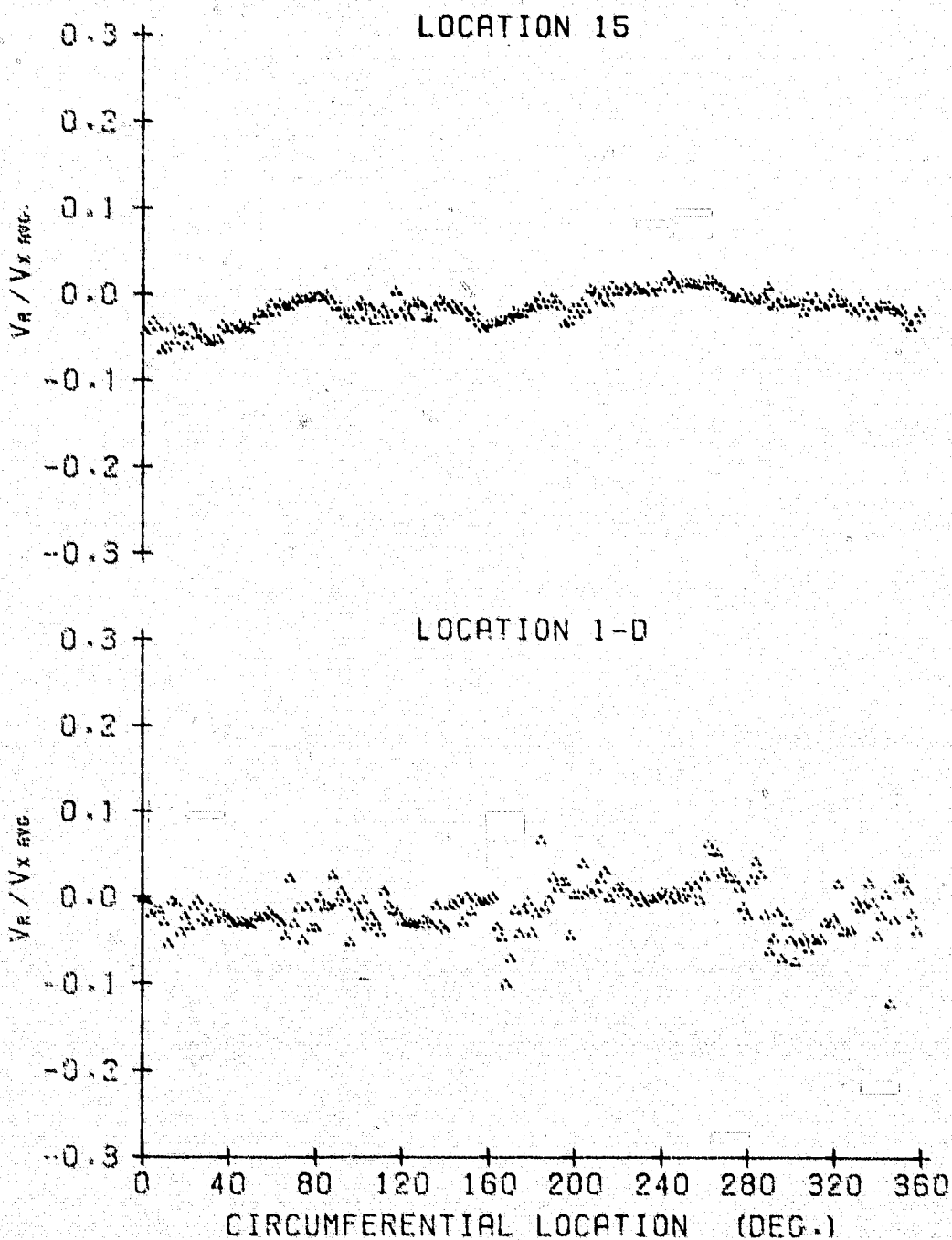


Figure F.93

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1695

AVG. FLOW COEF. = 0.540
AVG. P-RISE COEF. = 2.118
AVG. INCIDENCE = 5.53 DEG.

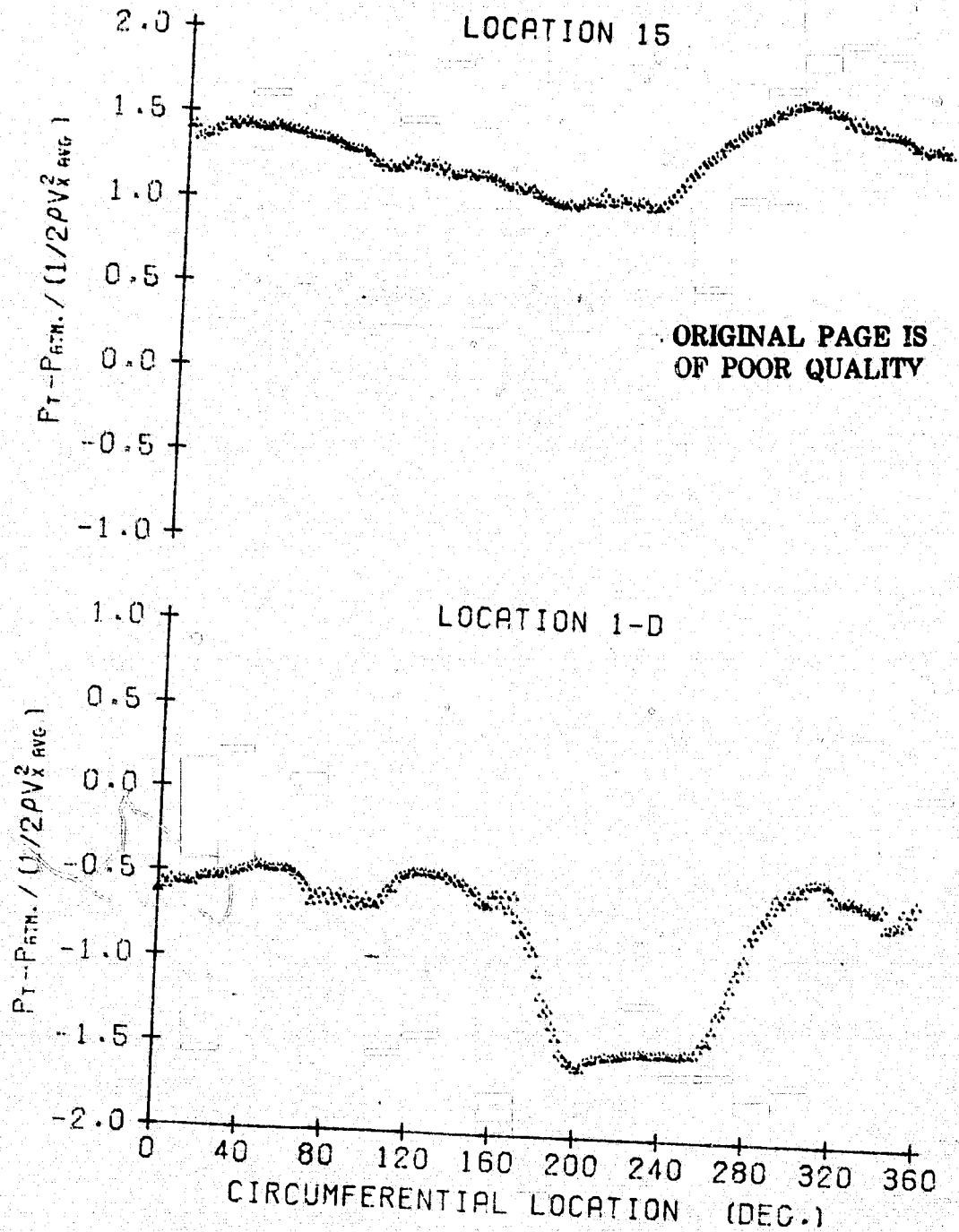


Figure F.94

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1695

AVG. FLOW COEF. = 0.540
AVG. P-RISE COEF. = 2.118
AVG. INCIDENCE = 5.53 DEG.

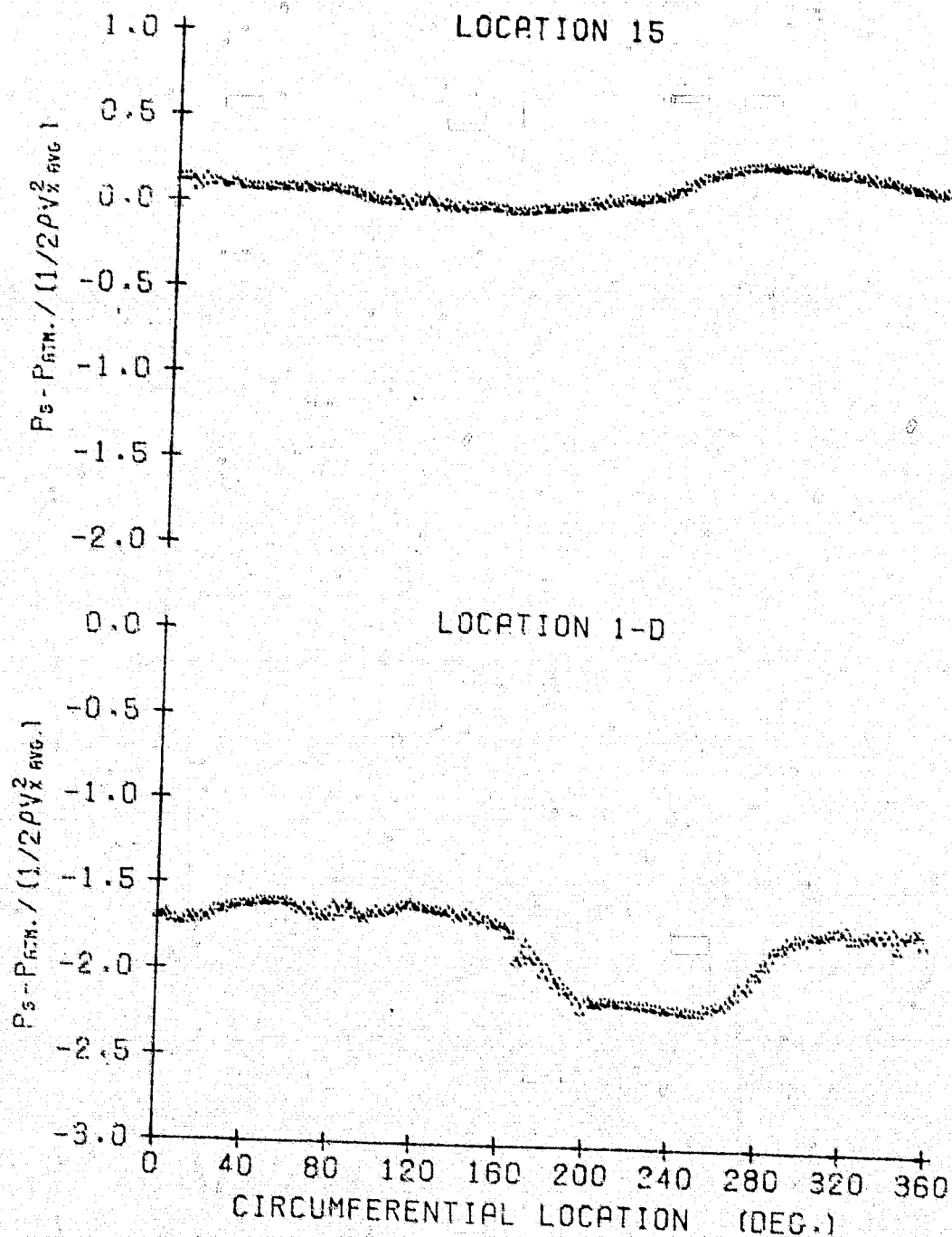


Figure F.95

10 October 1978
LCB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1695

AVG. FLOW COEF. = 0.540
AVG. P-RISE COEF. = 2.118
AVG. INCIDENCE = 5.53 DEG.

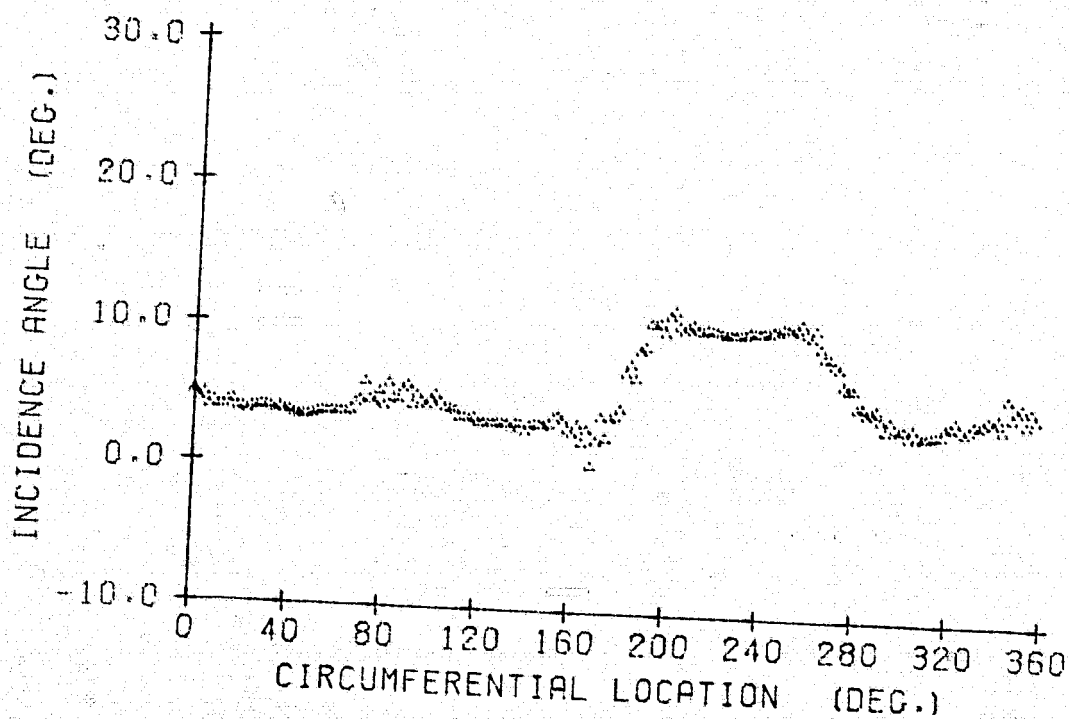


Figure F.96

10 October 1978

LCB:jep

5 BLADES

50 DEG. STAGGER ANGLE

50 DEG. SQ. DISTORTION

RPM = 1695

AVG. FLOW COEF. = 0.541

AVG. P-RISE COEF. = 2.062

AVG. INCIDENCE = 5.36 DEG.

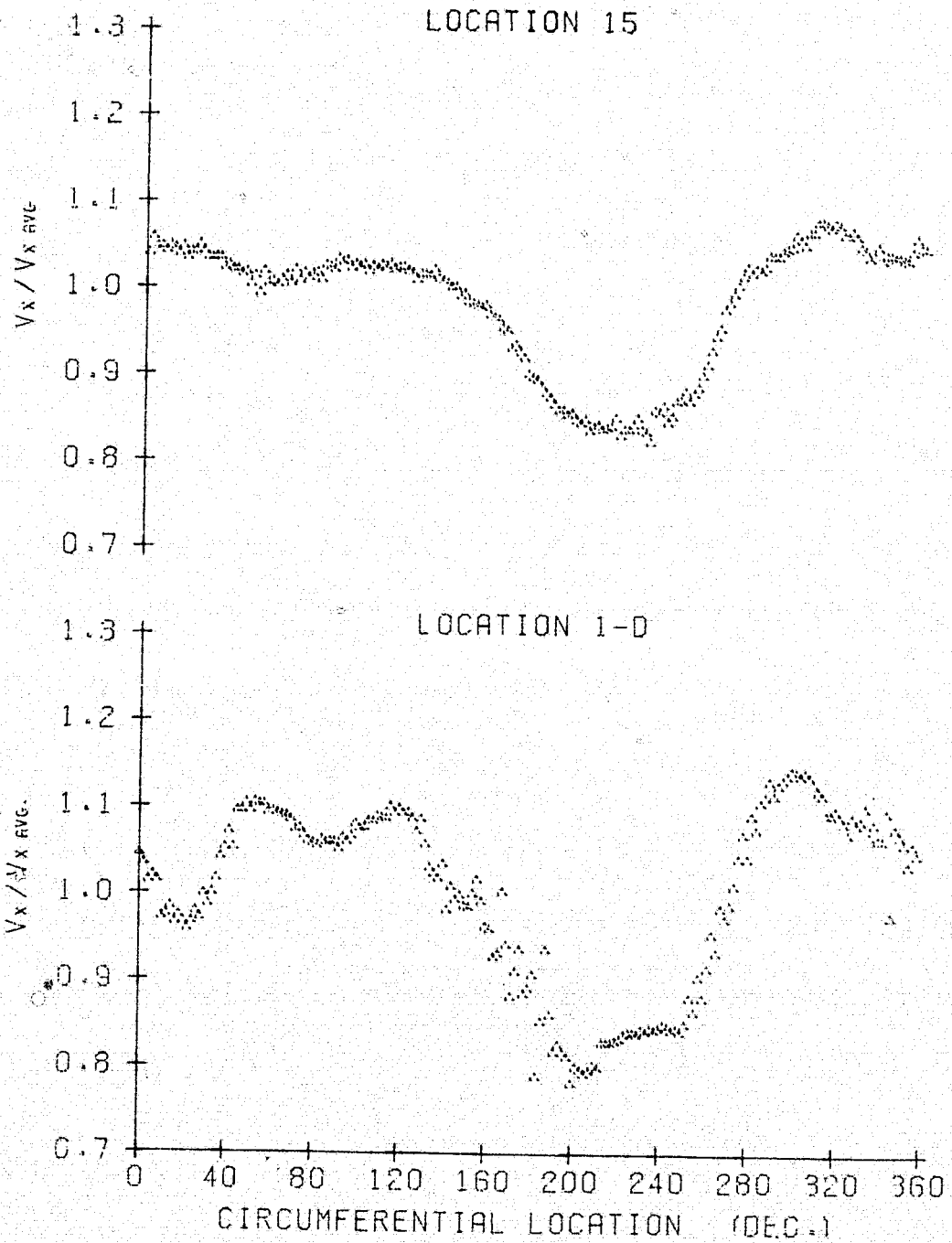


Figure F.97

10 October 1978
LCB:jep

3 BLADES
50 DEG. STAGGER ANGLE
00 DEG. SQ. DISTORTION
RPM = 1695

AVG. FLOW COEF. = 0.541
AVG. P-RISE COEF. = 2.062
AVG. INCIDENCE = 5.36 DEG.

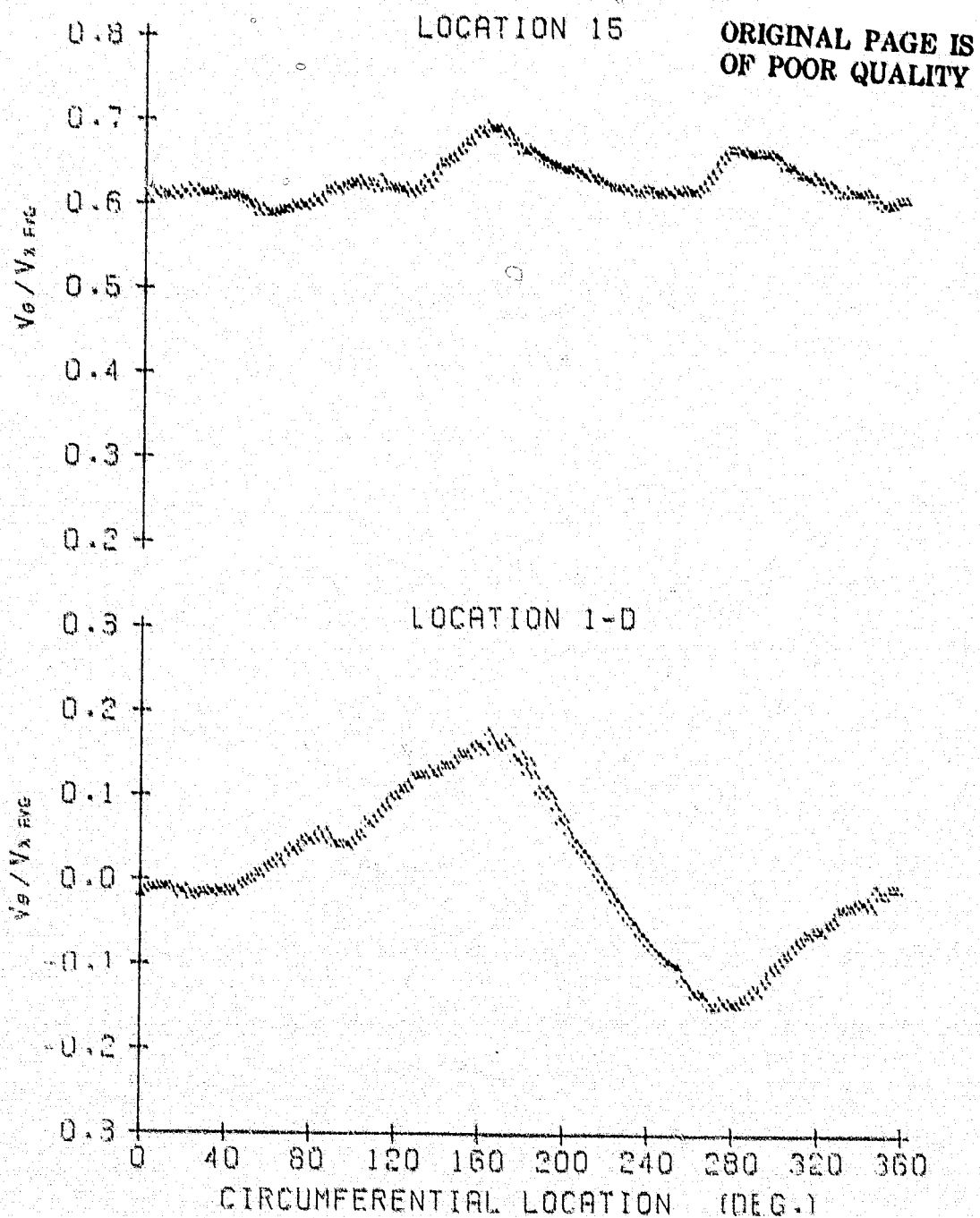


Figure F.98

10 October 1978
LCB:jep

9 BLADES
40 DEG. STAGGER ANGLE
30 DEG. SQ. DISTORTION
RPM = 1695

AVG. FLOW COEF. = 0.541
AVG. P-RISE COEF. = 2.062
AVG. INCIDENCE = 5.36 DEG.

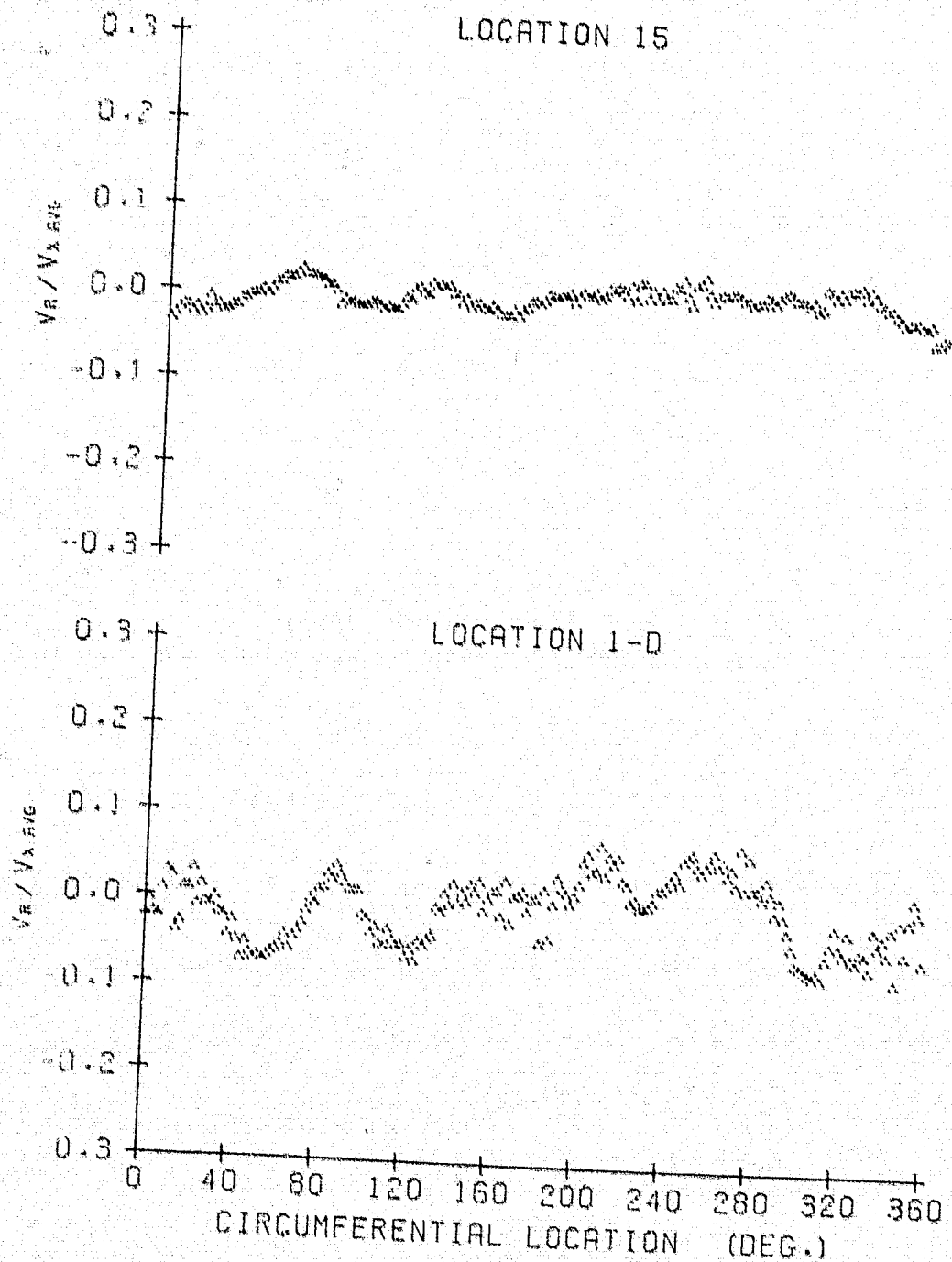


Figure F.99

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1695

AVG. FLOW COEF. = 0.541
AVG. P-RISE COEF. = 2.062
AVG. INCIDENCE = 5.36 DEG.

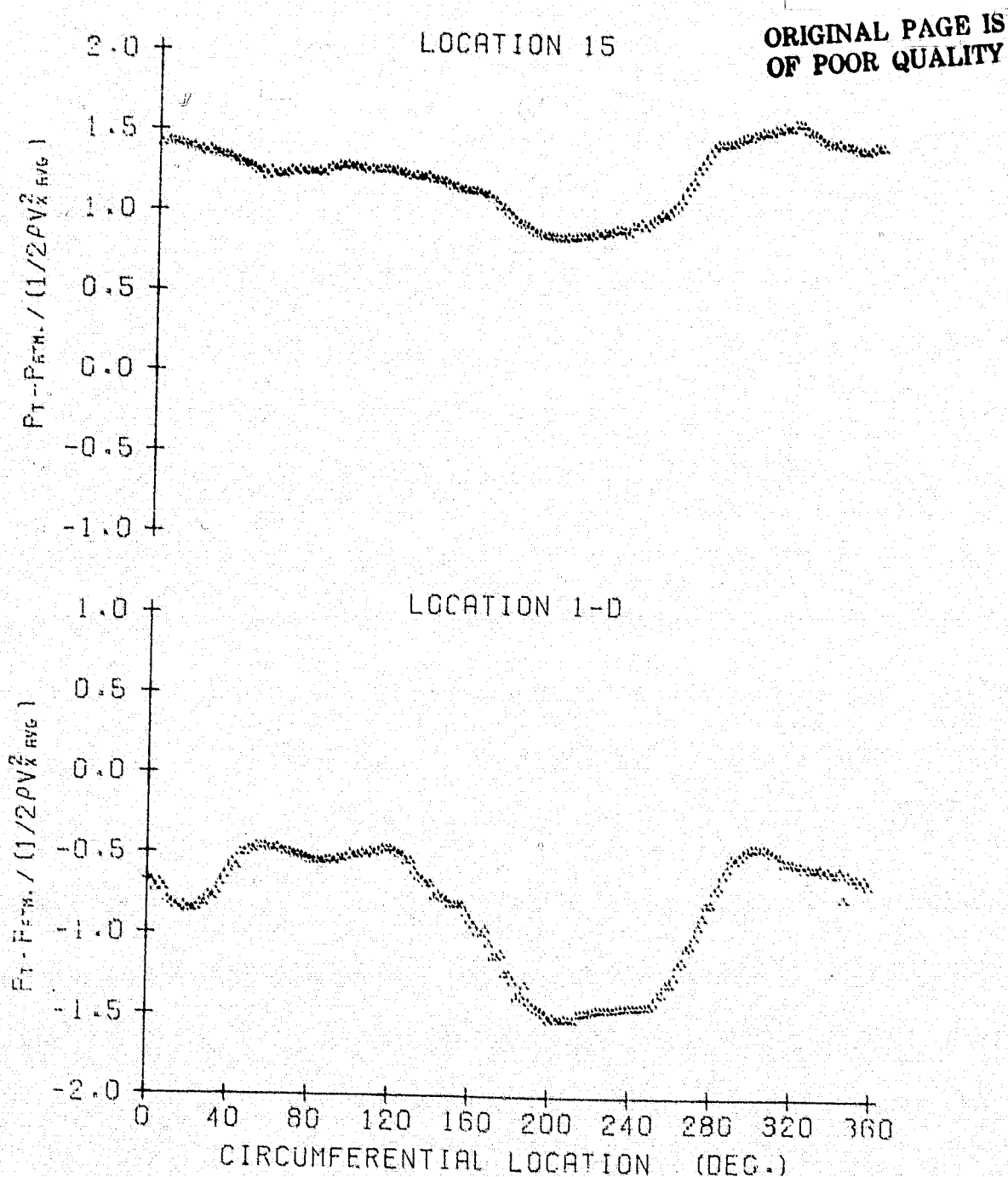


Figure F.100

10 October 1978
LGB:jep

3. 40PS
33 DEG. STAGGER ANGLE
30 DEG. SQ. DISTORTION
RPM 1695

AVG. FLOW COEF. = 0.541
AVG. P-RISE COEF. = 2.062
AVG. INCIDENCE = 5.36 DEG.

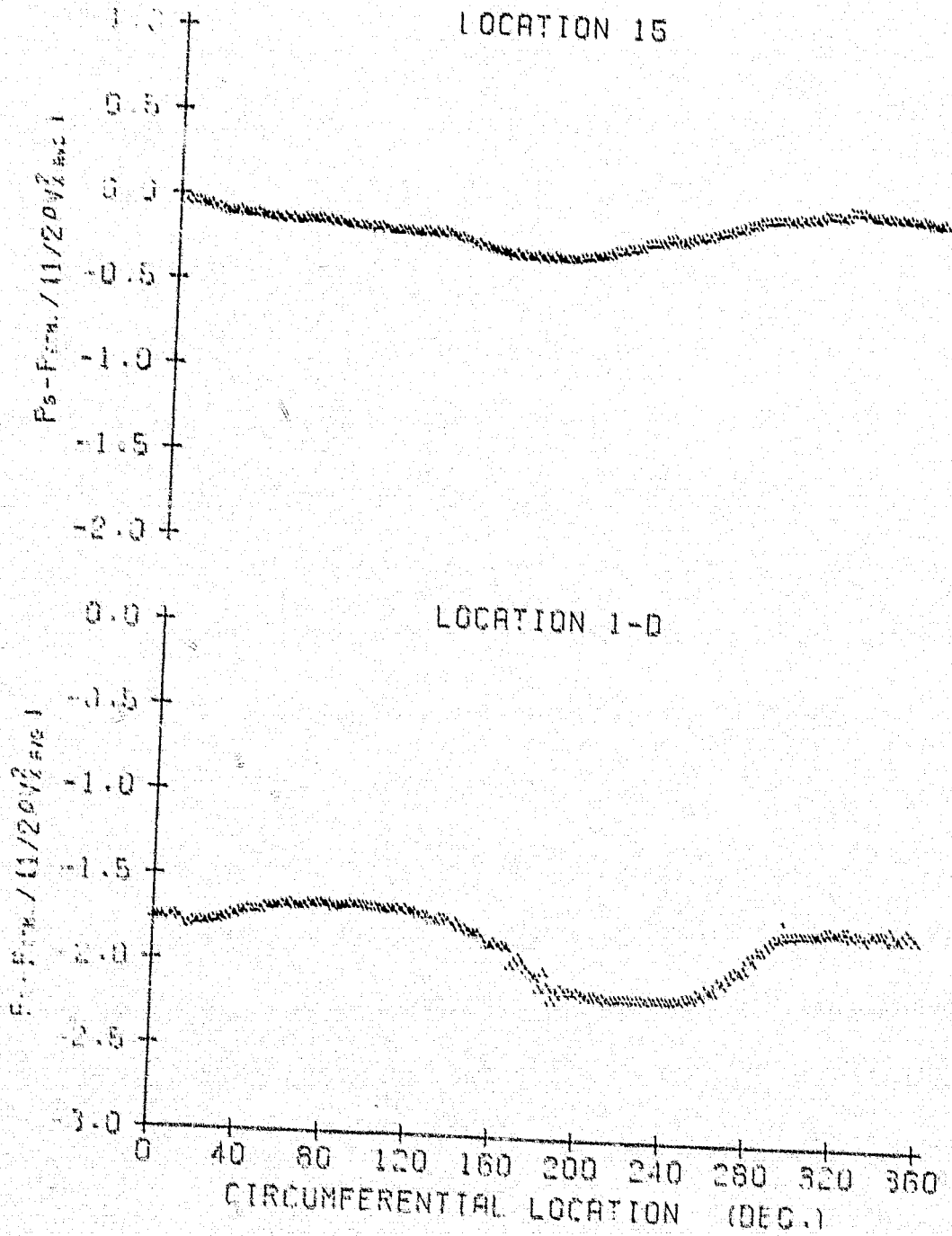


Figure F.101

10 October 1978
LCB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1695

AVG. FLOW COEF. = 0.541
AVG. P-RISE COEF. = 2.062
AVG. INCIDENCE = 5.36 DEG.

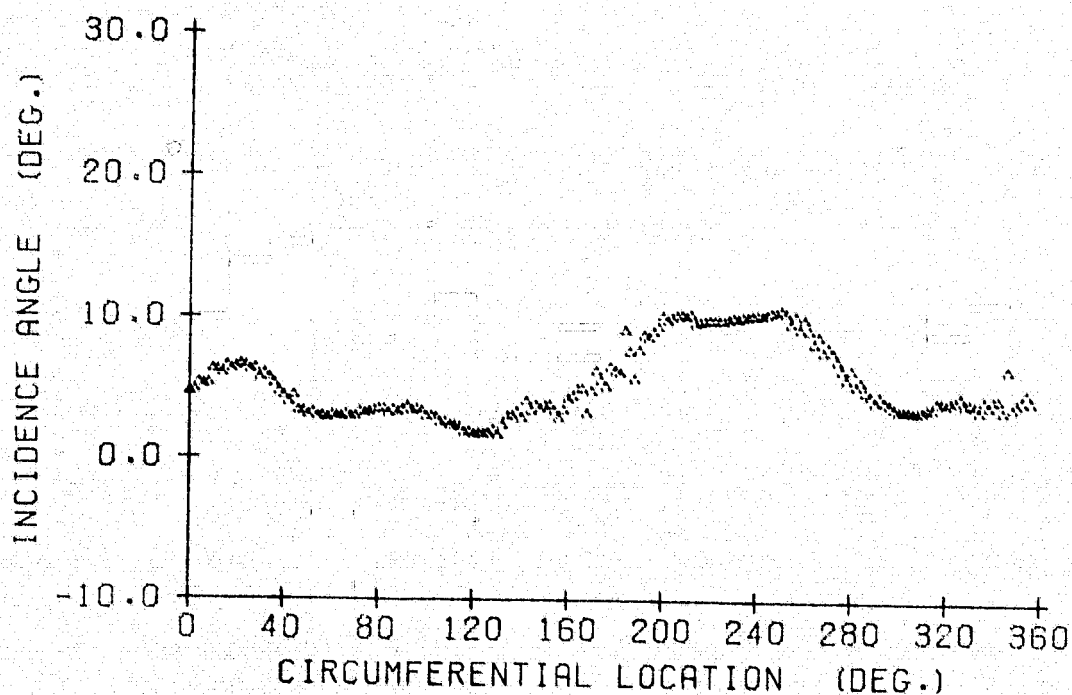


Figure F.102

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
80 DEG. SQ. DISTORTION
RPM = 1695

AVG. FLOW COEF. = 0.555
AVG. P-RISE COEF. = 1.917
AVG. INCIDENCE = 4.70 DEG.

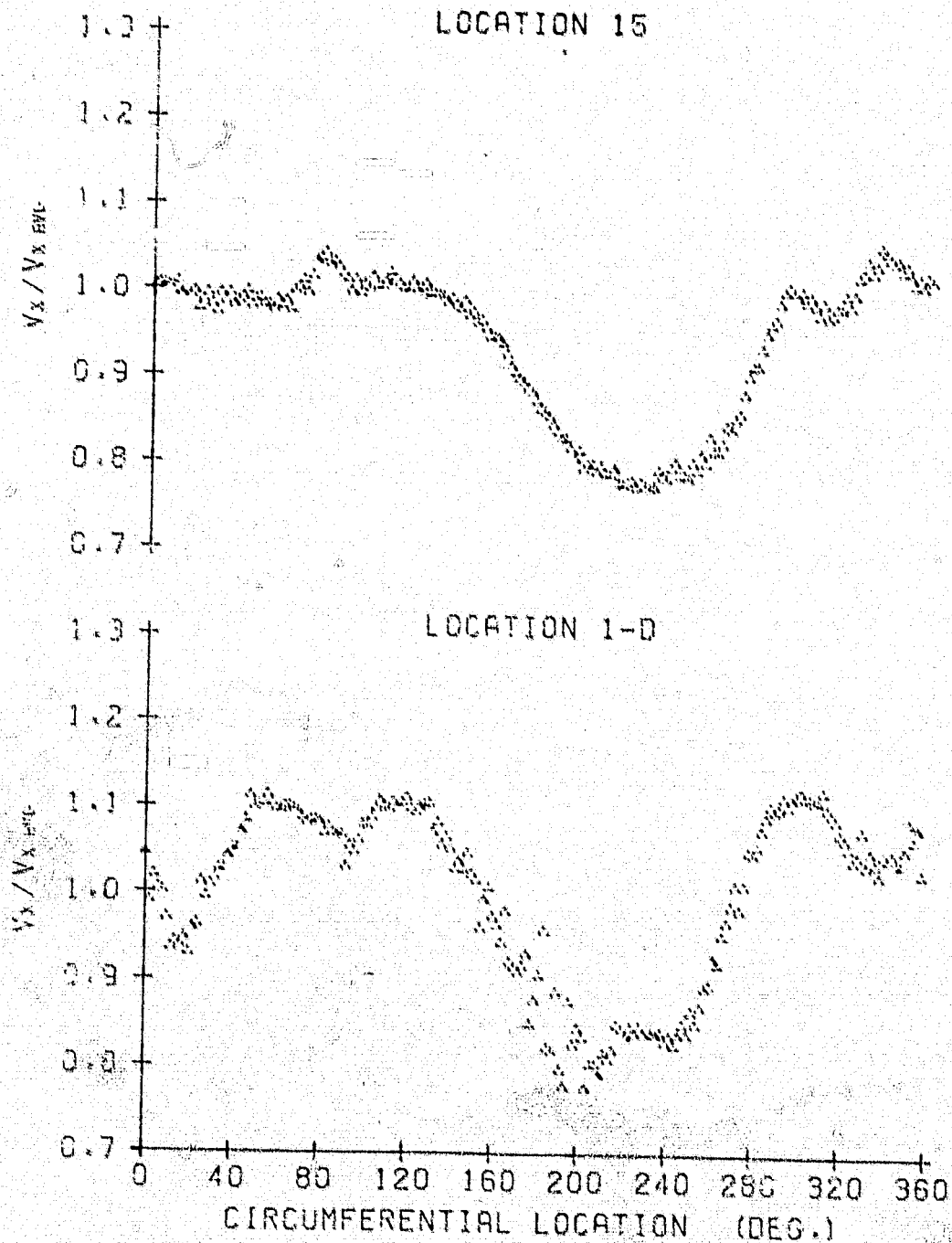


Figure F.103

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1695

AVG. FLOW COEF. = 0.555
AVG. P-RISE COEF. = 1.917
AVG. INCIDENCE = 4.70 DEG.

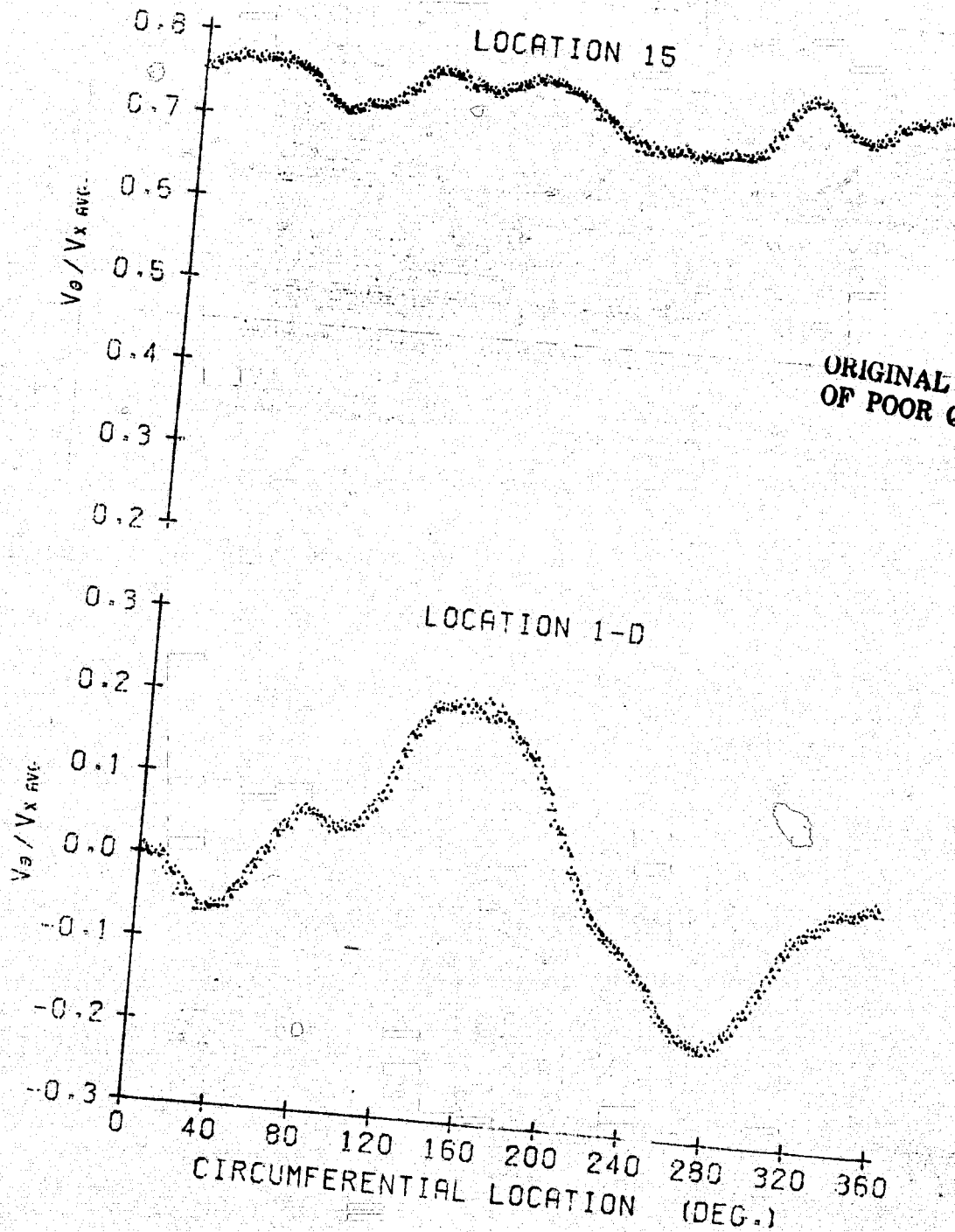


Figure F.104

10 October 1978
LCB:jep

9 SLADES
50 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1695

AVG. FLOW COEF. = 0.555
AVG. P-RISE COEF. = 1.917
AVG. INCIDENCE = 4.70 DEG.

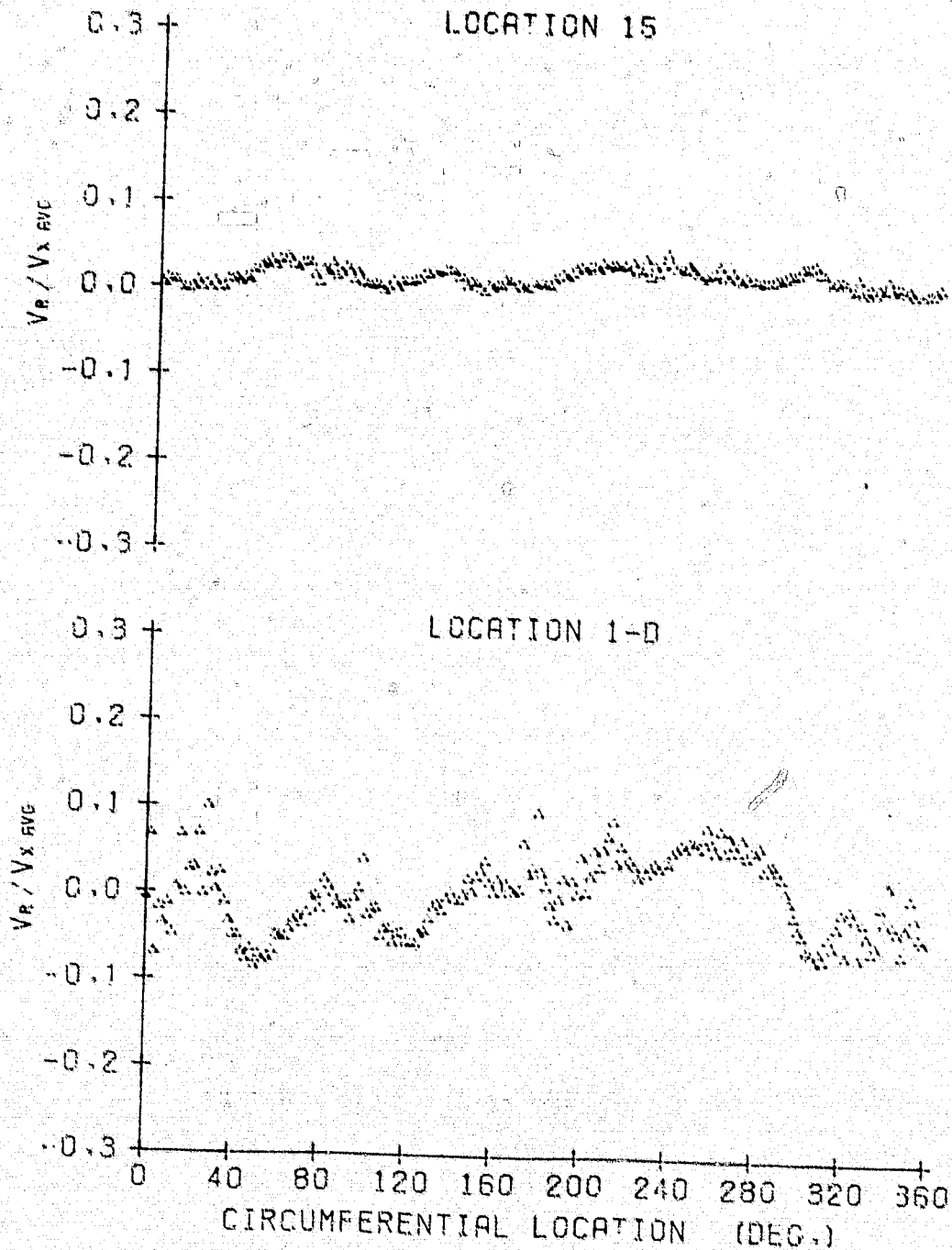


Figure F.105

10 October 1978

LCB:jep

9 BLADES

50 DEG. STAGGER ANGLE

90 DEG. SQ. DISTORTION

RPM = 1695

AVG. FLOW COEF. = 0.555

AVG. P-RISE COEF. = 1.917

AVG. INCIDENCE = 4.70 DEG.

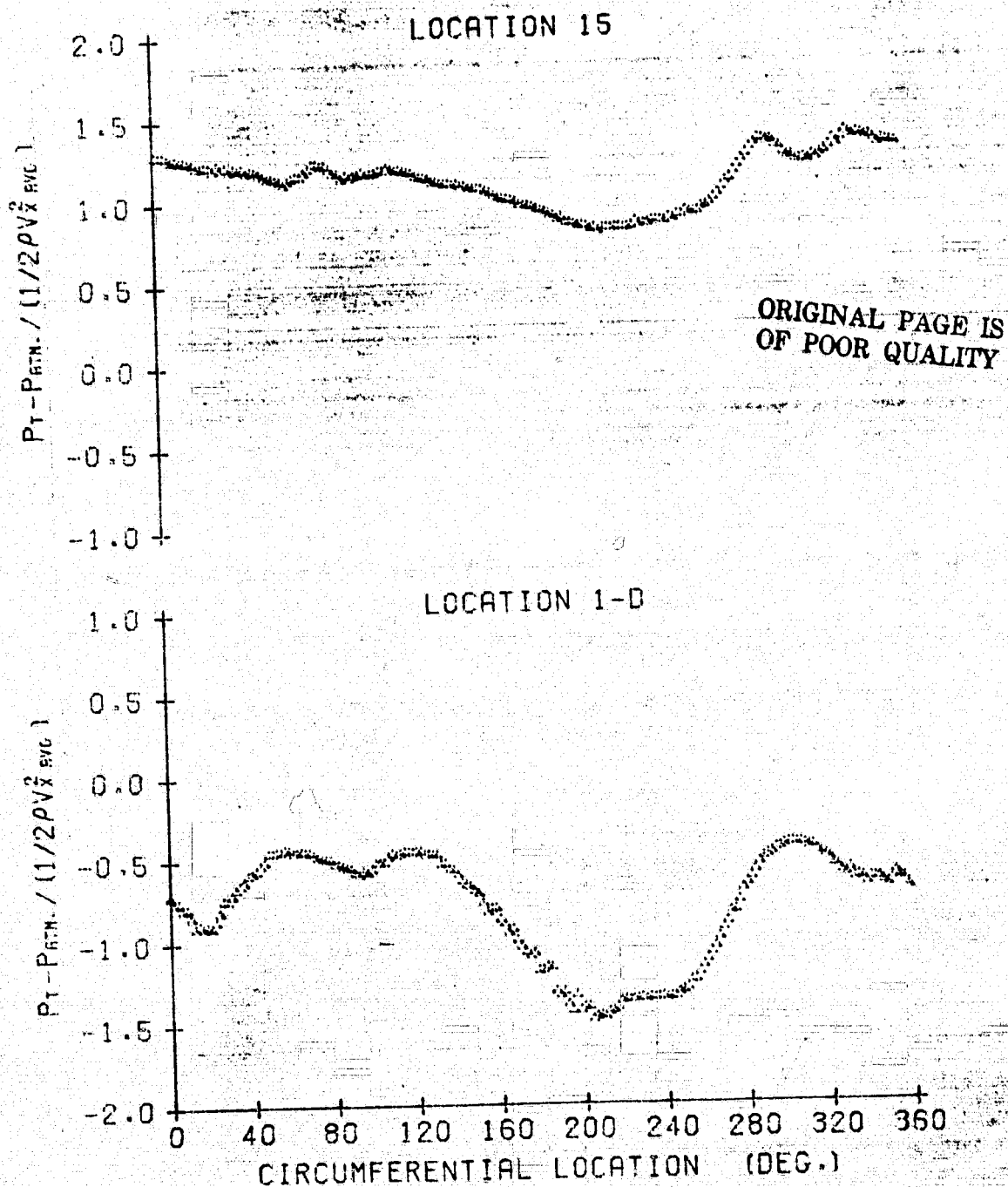


Figure F.106

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1695

AVG. FLOW COEF. = 0.555
AVG. P-RISE COEF. = 1.917
AVG. INCIDENCE = 4.70 DEG.

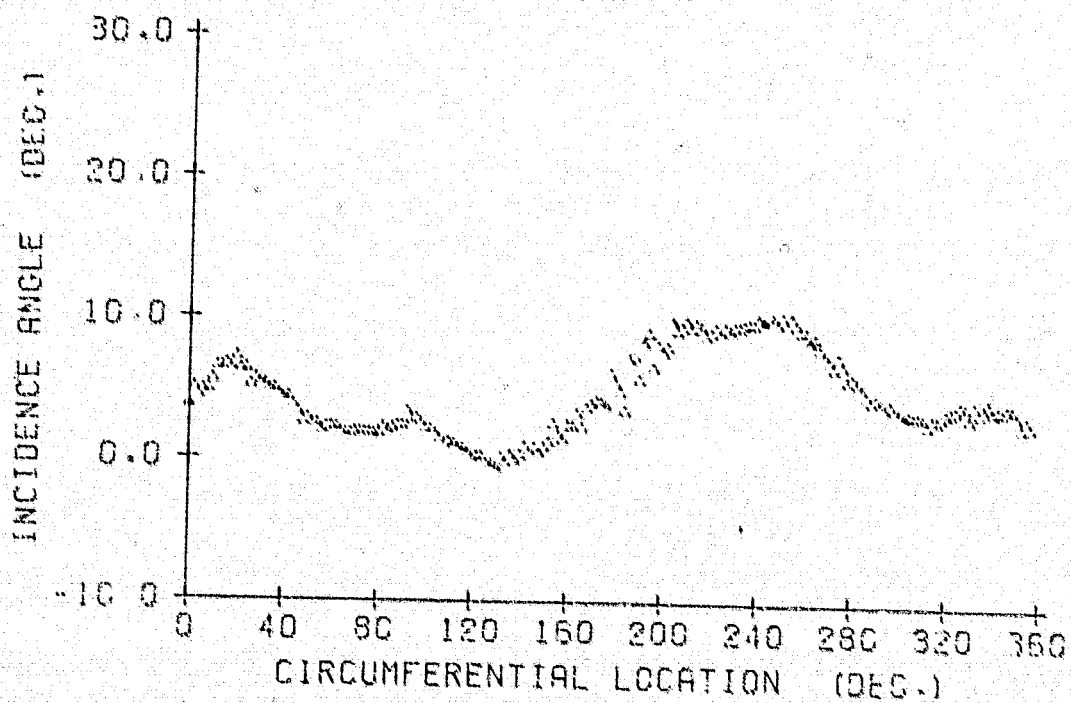


Figure F.107

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
90 DEG. SQ. DISTORTION
RPM = 1695

AVG. FLOW COEF. = 0.555
AVG. P-RISE COEF. = 1.917
AVG. INCIDENCE = 4.70 DEG.

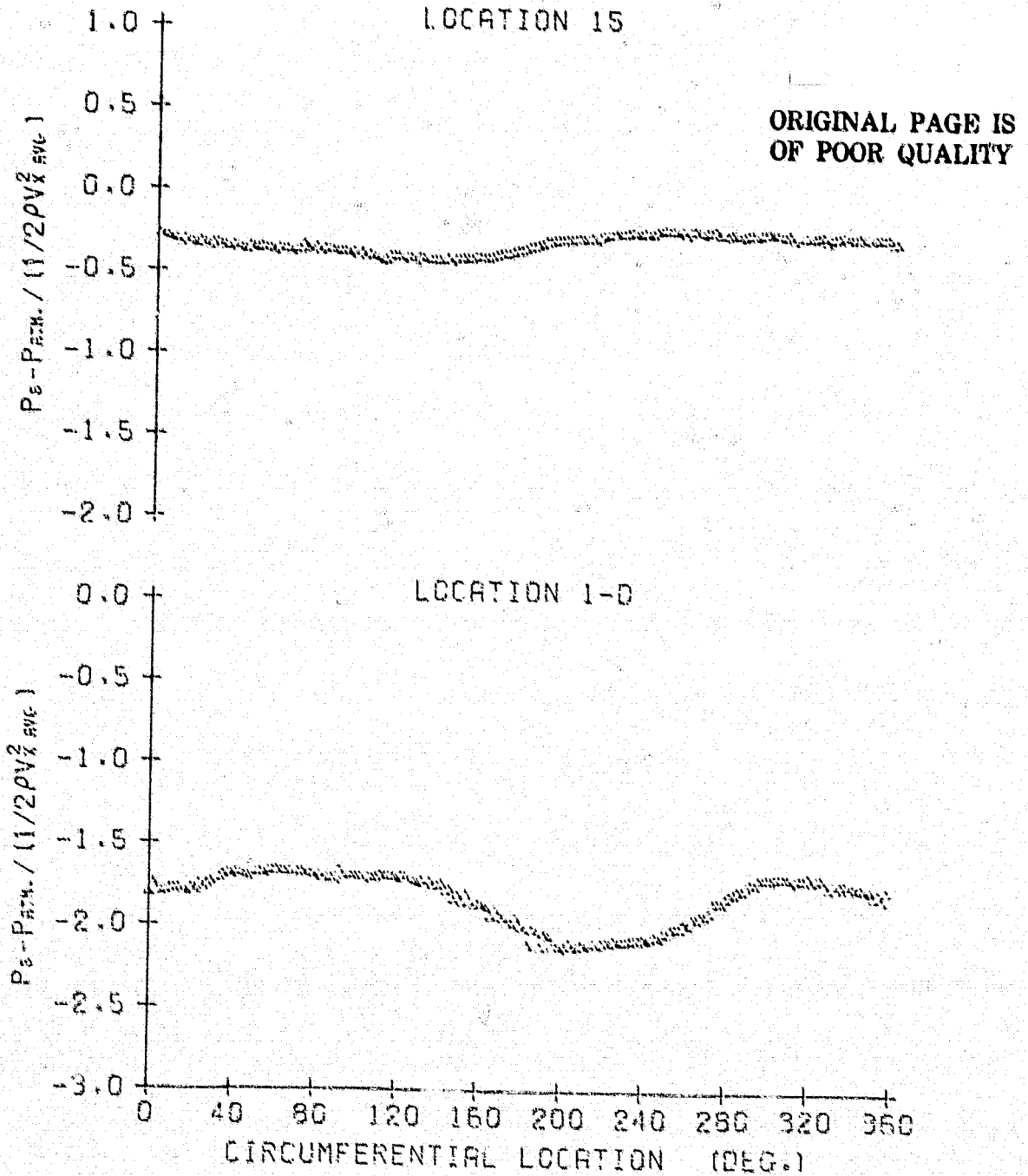


Figure F.108

Appendix G

Data for the 180 Degree Square Distortion

Table G.1

Test Conditions for the 180 Degree Square Distortion

Figure Numbers	Solidity	Rotor/Stator Spacing	Distance from Hub Surface
G.1-G.6	0.74	—	2.75 in. (6.985cm)
G.7-G.12	0.74	—	2.75 in.
G.13-G.18	0.74	—	2.75 in.
G.19-G.24	0.74	—	2.75 in.
G.25-G.30	0.74	—	2.75 in.
G.31-G.36	0.74	—	2.75 in.
G.37-G.42	0.74	—	2.75 in.
G.43-G.48	0.74	—	2.75 in.
G.49-G.54	1.11	12 in. (30.47cm)	2.75 in.
G.55-G.60	1.11	12 in.	2.75 in.
G.61-G.66	1.11	12 in.	2.75 in.
G.67-G.72	1.11	3 in.	2.75 in.
G.73-G.78	1.11	3 in.	2.75 in.
G.79-G.84	1.11	3 in.	2.75 in.
G.85-G.90	0.90	12 in.	4.58 in. (11.64cm)
G.91-G.96	0.99	12 in.	3.67 in. (9.31cm)
G.97-G.102	1.26	12 in.	1.83 in. (4.66cm)
G.103-G.108	1.45	12 in.	0.92 in. (2.33cm)

Table G.1 (con't)

Test Conditions for the 180 Degree Square Distortion

Figure Numbers	No. of Blades	Stagger Angle (degrees)	$V_{xavginlet}$ (ft/sec)	$V_{xavgexit}$ (ft/sec)	RPM	Average ϕ	Average $\Delta P_T / \frac{1}{2} \rho V_{xavg}^2$	Average Incidence (degrees)
G.1-G.6	6	35	65.35	64.94	692	1.396	0.017	0.80
G.7-G.12	6	35	63.13	63.67	955	0.977	0.435	10.78
G.13-G.18	6	35	66.66	67.17	1138	0.866	0.766	14.18
G.19-G.24	6	45	63.61	63.28	989	0.951	0.054	1.57
G.25-G.30	6	45	64.44	65.08	1328	0.717	0.755	9.41
G.31-G.36	6	55	60.59	61.47	1412	0.634	0.148	2.18
G.37-G.42	6	55	59.30	62.09	1646	0.533	0.801	6.47
G.43-G.48	6	55	62.20	63.56	1941	0.474	1.794	9.35
G.49-G.54	9	50	61.99	65.82	1515	0.605	1.295	2.56
G.55-G.60	9	50	63.13	62.37	1688	0.553	2.011	4.79
G.61-G.66	9	50	62.63	59.95	1825	0.507	2.679	6.85
G.67-G.72	9	50	62.09	66.75	1515	0.606	1.268	2.69
G.73-G.78	9	50	66.10	64.98	1688	0.579	1.762	3.75
G.79-G.84	9	50	65.41	63.90	1825	0.530	2.356	5.94
G.85-G.90	9	50	60.46	60.12	1688	0.530	2.272	5.95
G.91-G.96	9	50	66.51	65.68	1688	0.583	1.807	3.66
G.97-G.102	9	50	60.24	59.98	1688	0.528	2.165	5.95
G.103-G.108	9	50	62.49	59.14	1688	0.547	1.949	5.06

10 October 1978
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6 BLADES
35 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 692

AVG. FLOW COEF. = 1.396
AVG. P-RISE COEF. = 0.017
AVG. INCIDENCE = 0.80 DEG.

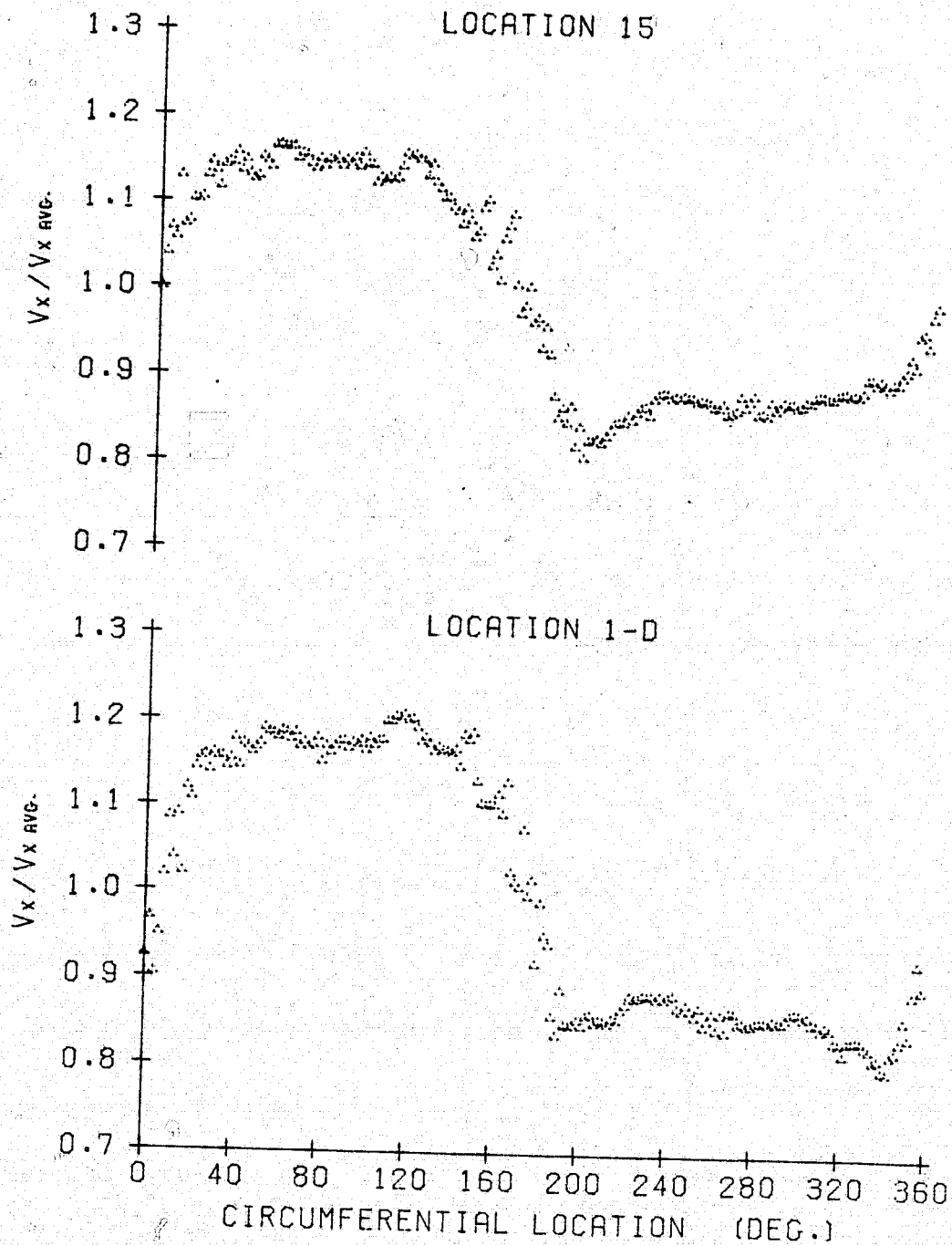


Figure G.1

10 October 1978
LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 692

AVG. FLOW COEF. = 1.396
AVG. P-RISE COEF. = 0.017
AVG. INCIDENCE = 0.80 DEG.

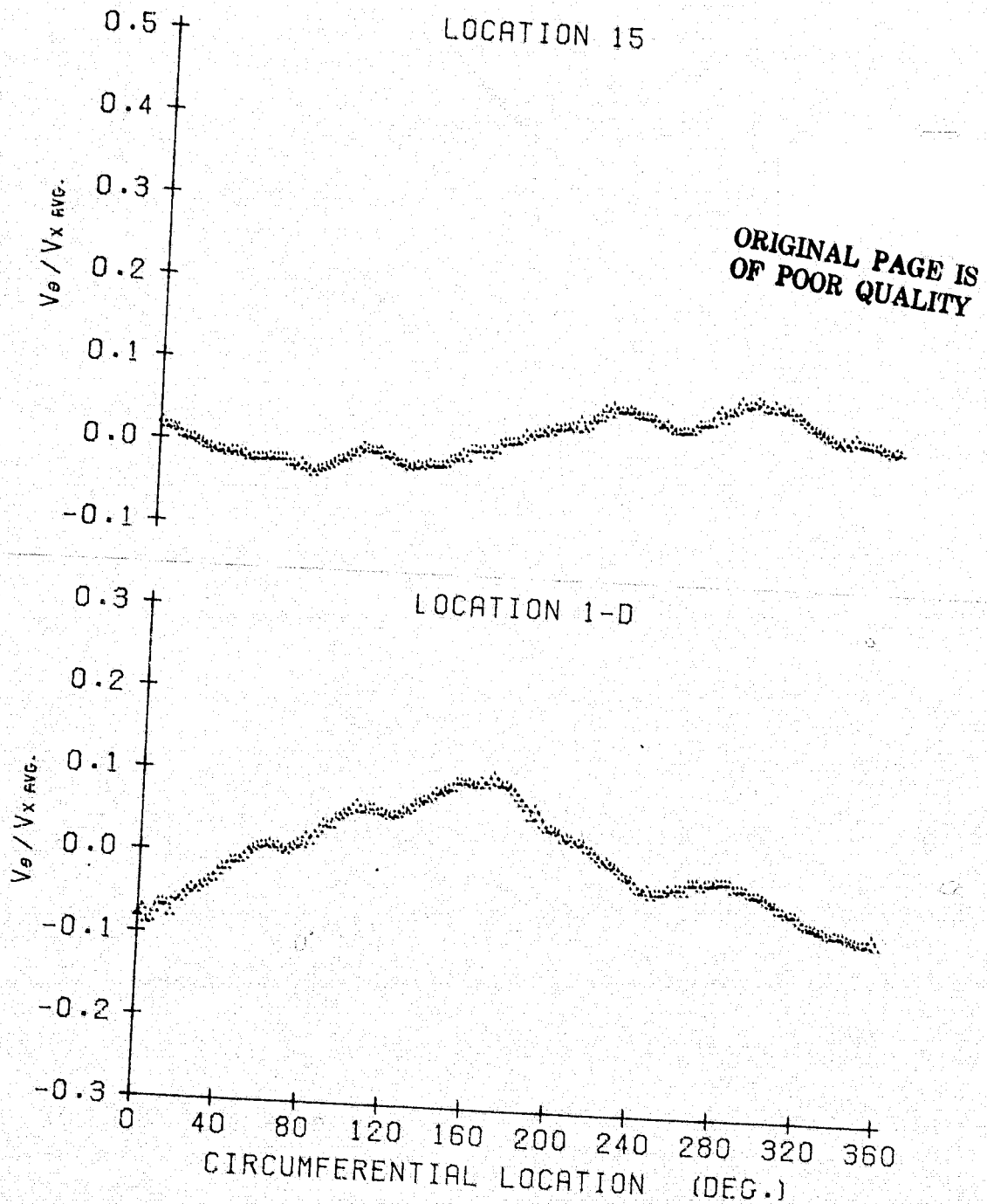


Figure G.2

10 October 1978

LGB:jep

6 BLADES

35 DEG. STAGGER ANGLE

180 DEG. SQ. DISTORTION

RPM = 692

AVG. FLOW COEF. = 1.396

AVG. P-RISE COEF. = 0.017

AVG. INCIDENCE = 0.80 DEG.

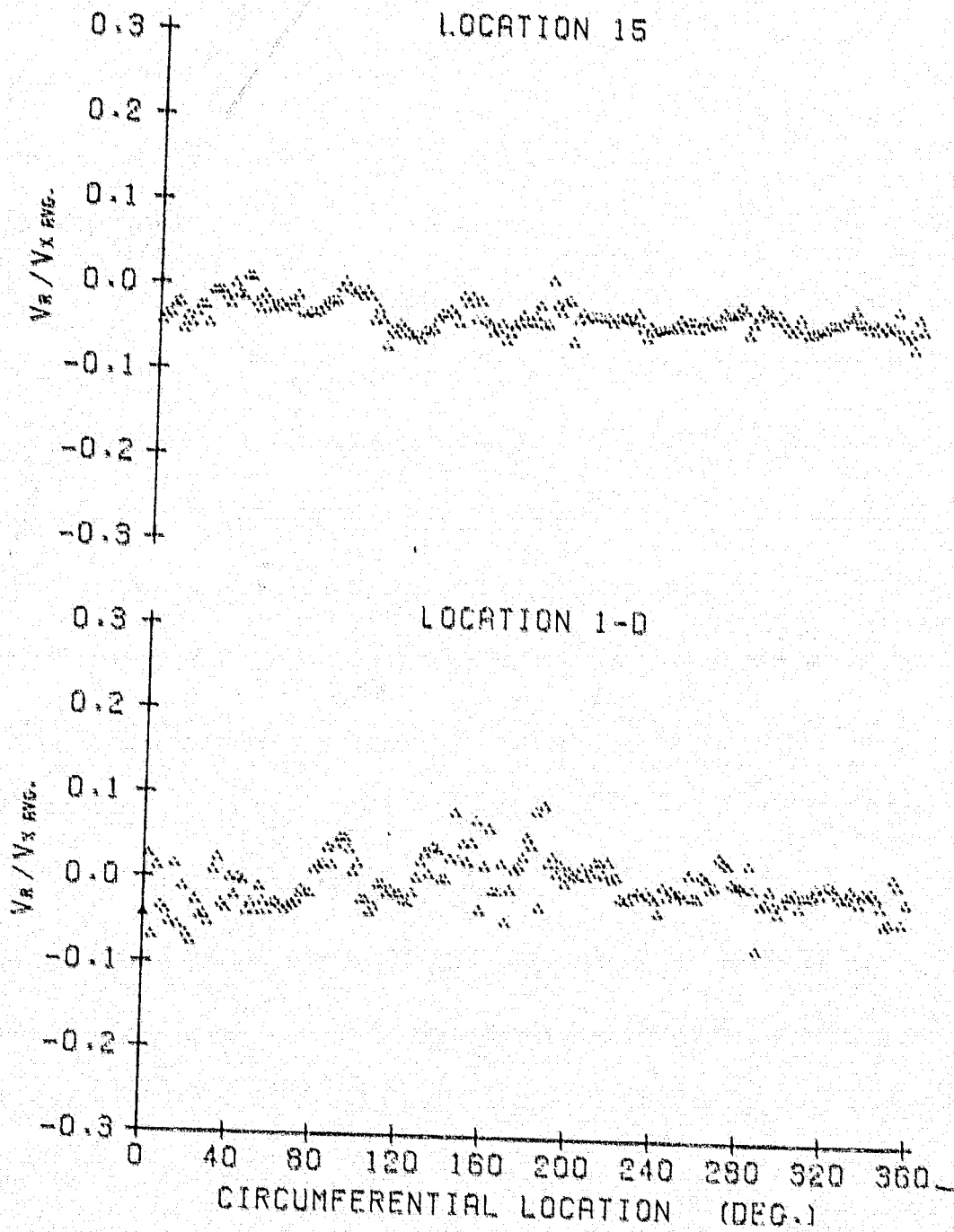


Figure G.3

G

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10 October 1978
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6 BLADES

35 DEG. STAGGER ANGLE

180 DEG. SQ. DISTORTION

RPM = 692

AVG. FLOW COEF. = 1.396

AVG. P-RISE COEF. = 0.017

AVG. INCIDENCE = 0.80 DEG.

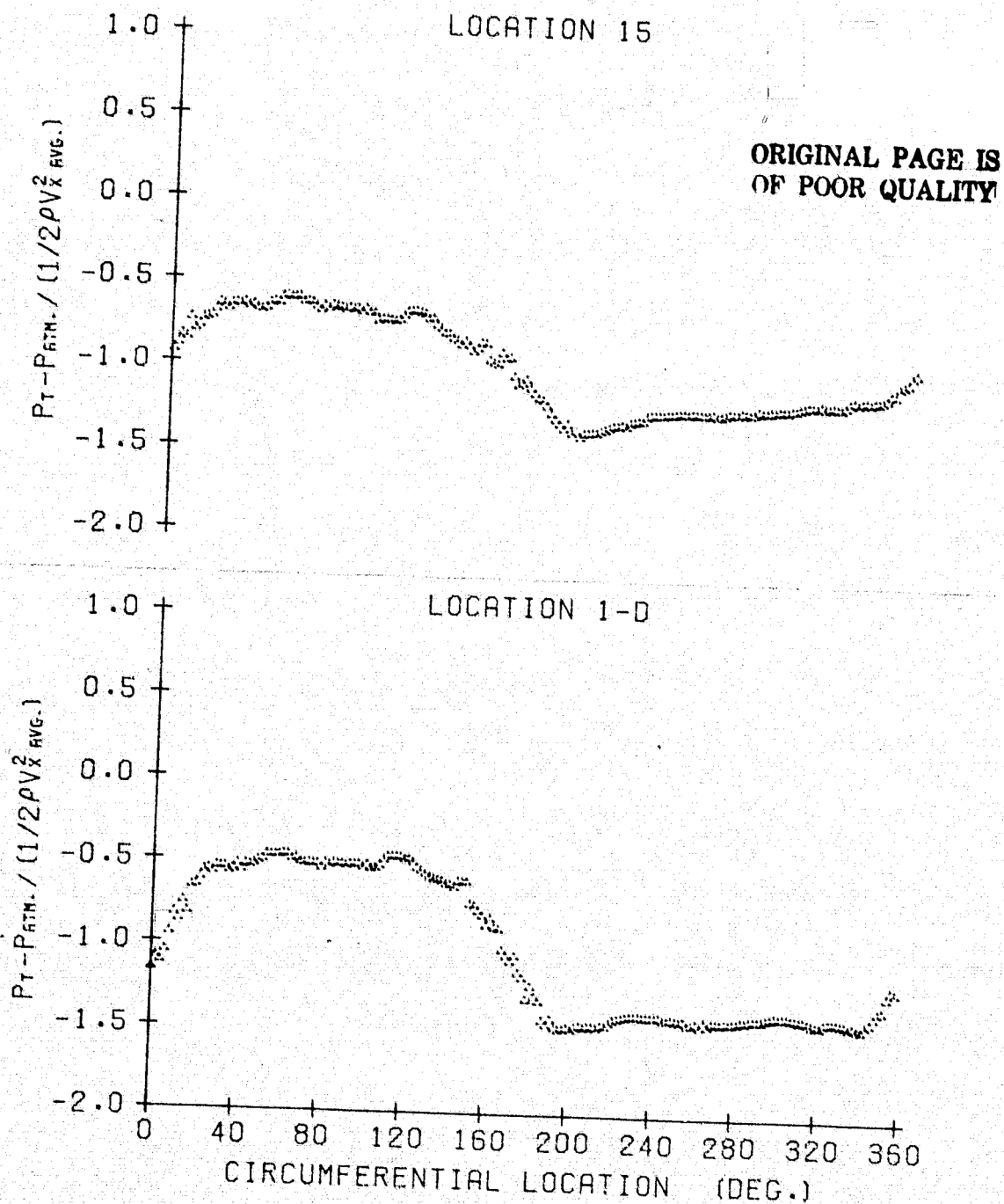


Figure G.4

10 October 1978
LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 692

AVG. FLOW COEF. = 1.396
AVG. P-RISE COEF. = 0.017
AVG. INCIDENCE = 0.80 DEG.

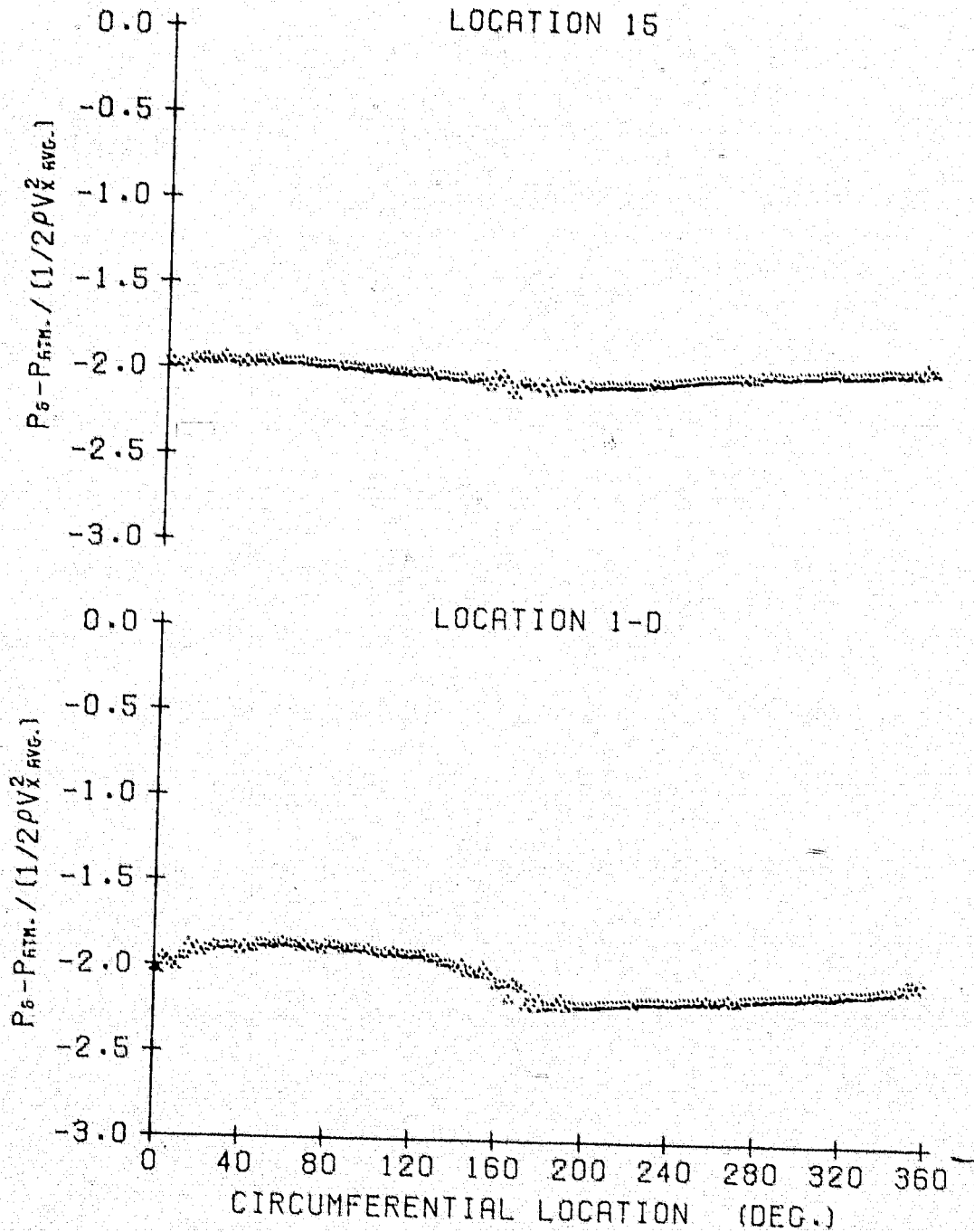


Figure G.5

10 October 1978
LCB:jep

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6 BLADES
35 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 692
AVG. FLOW COEF. = 1.396
AVG. P-RISE COEF. = 0.017
AVG. INCIDENCE = 0.80 DEG.

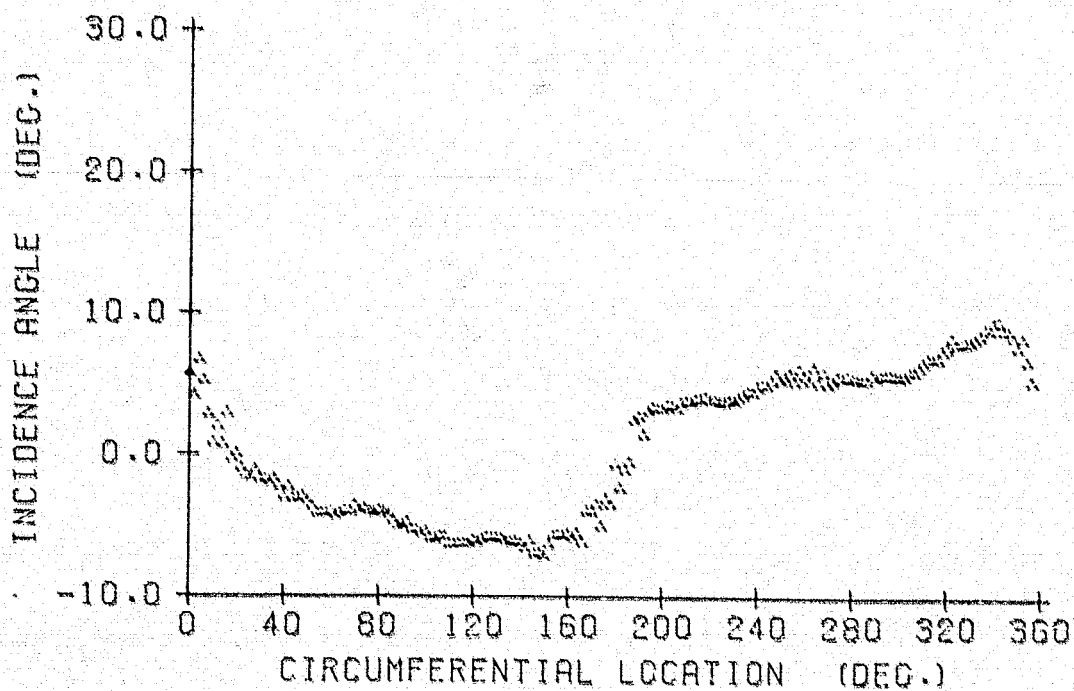


Figure G.6

-446-

10 October 1978
LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 955

AVG. FLOW COEF. = 0.977
AVG. P-RISE COEF. = 0.435
AVG. INCIDENCE = 10.78 DEG.

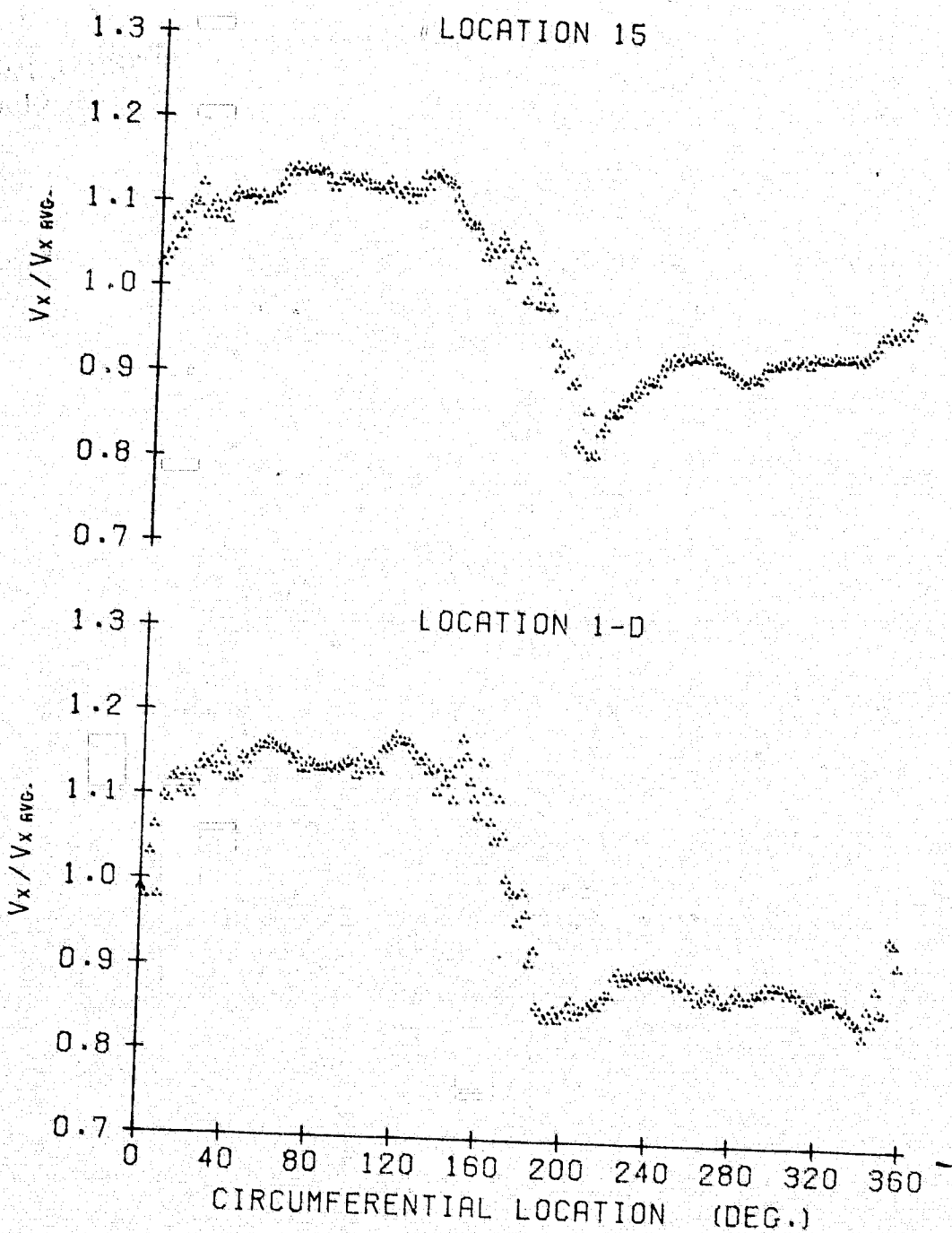


Figure G.7

10 October 1978
LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 955
AVG. FLOW COEF. = 0.977
AVG. P-RISE COEF. = 0.435
AVG. INCIDENCE = 10.78 DEG.

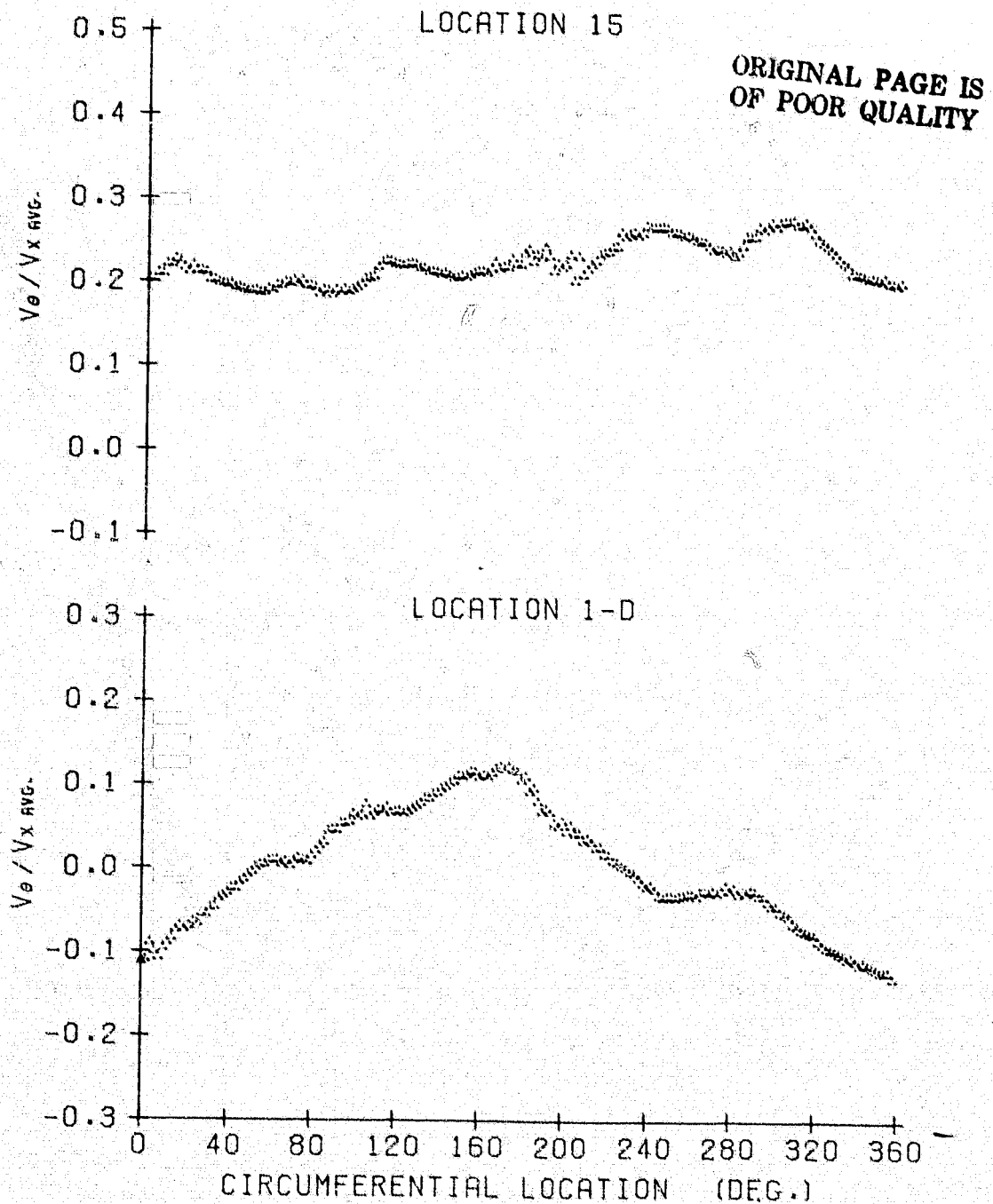


Figure G.8

10 October 1978
LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 955

AVG. FLOW COEF. = 0.977
AVG. P-RISE COEF. = 0.435
AVG. INCIDENCE = 10.78 DEG.

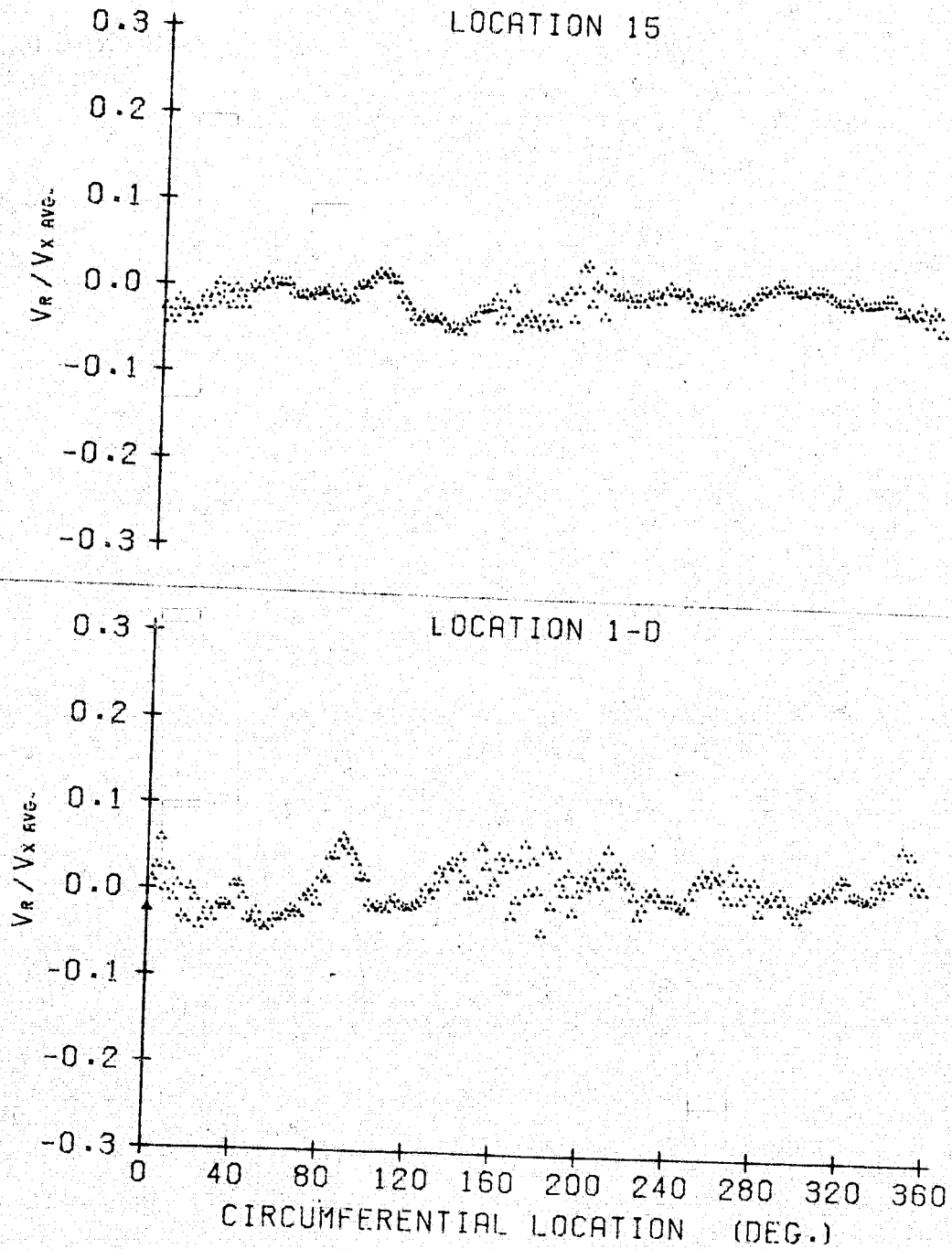


Figure G.9

10 October 1978
LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 955

AVG. FLOW COEF. = 0.977
AVG. P-RISE COEF. = 0.435
AVG. INCIDENCE = 10.78 DEG.

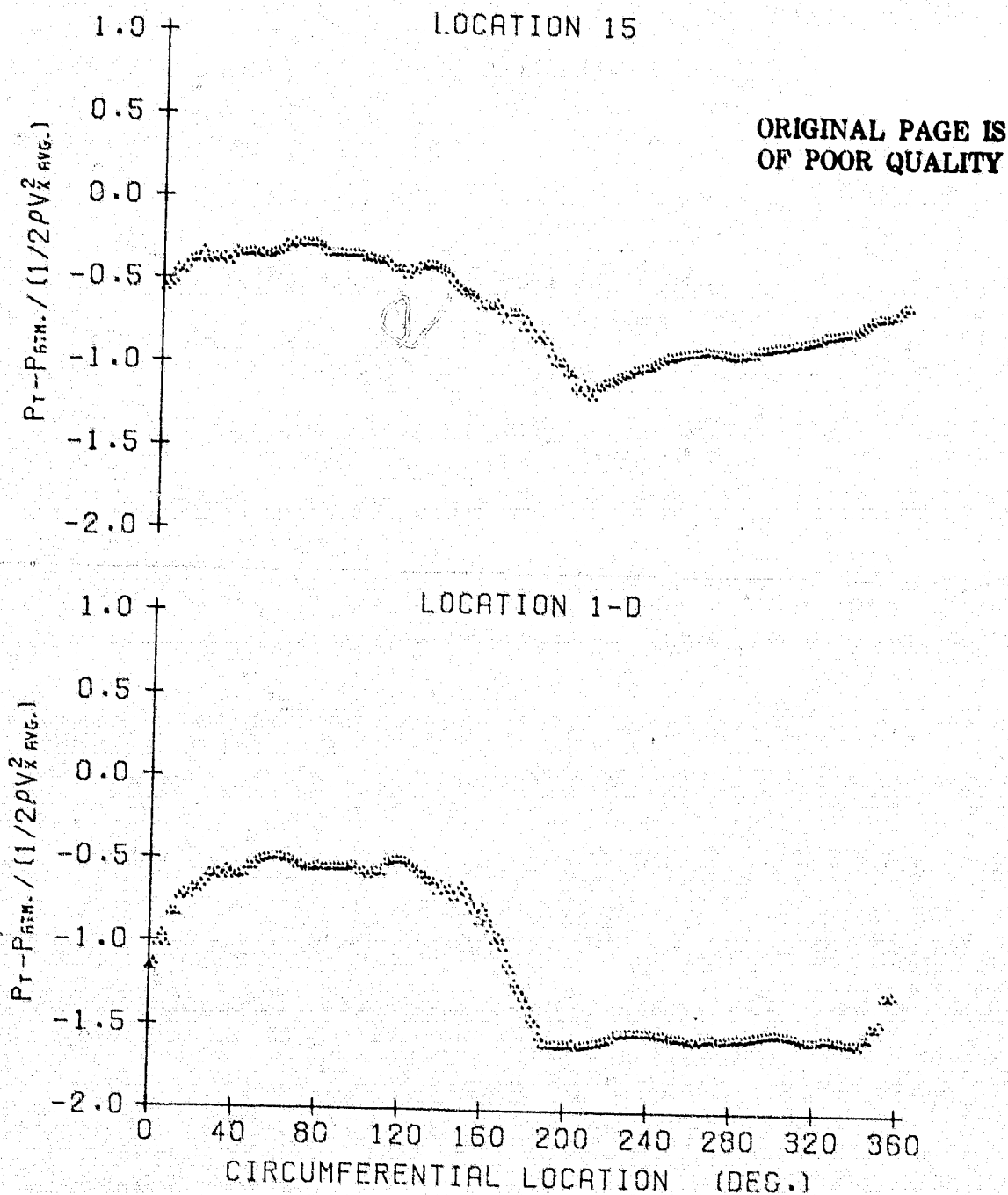


Figure G.10

10 October 1978
LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 955

AVG. FLOW COEF. = 0.977
AVG. P-RISE COEF. = 0.435
AVG. INCIDENCE = 10.78 DEG.

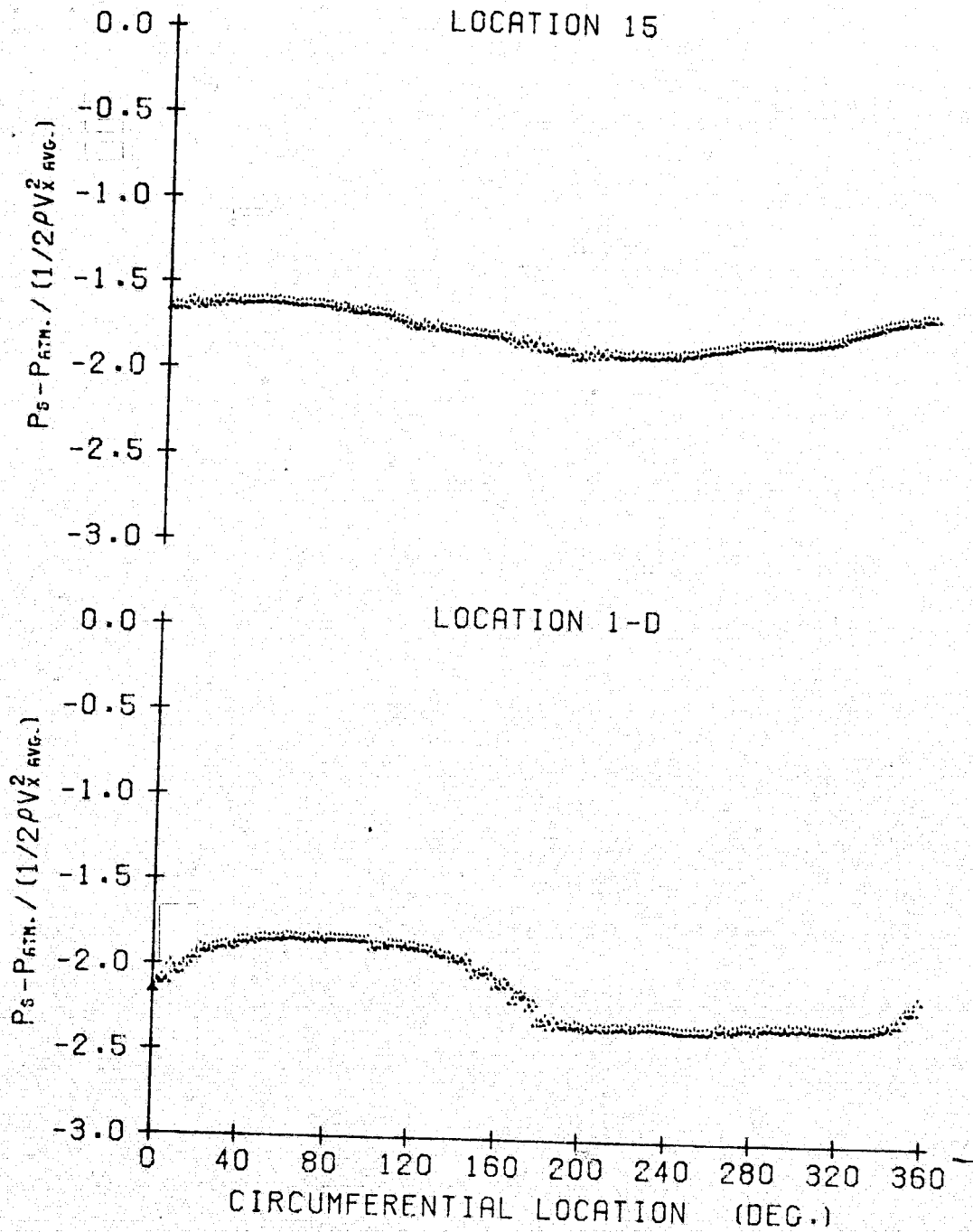


Figure G.11

10 October 1978
LCB:jep

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6 BLADES
35 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 955
AVG. FLOW COEF. = 0.977
AVG. P-RISE COEF. = 0.435
AVG. INCIDENCE = 10.78 DEG.

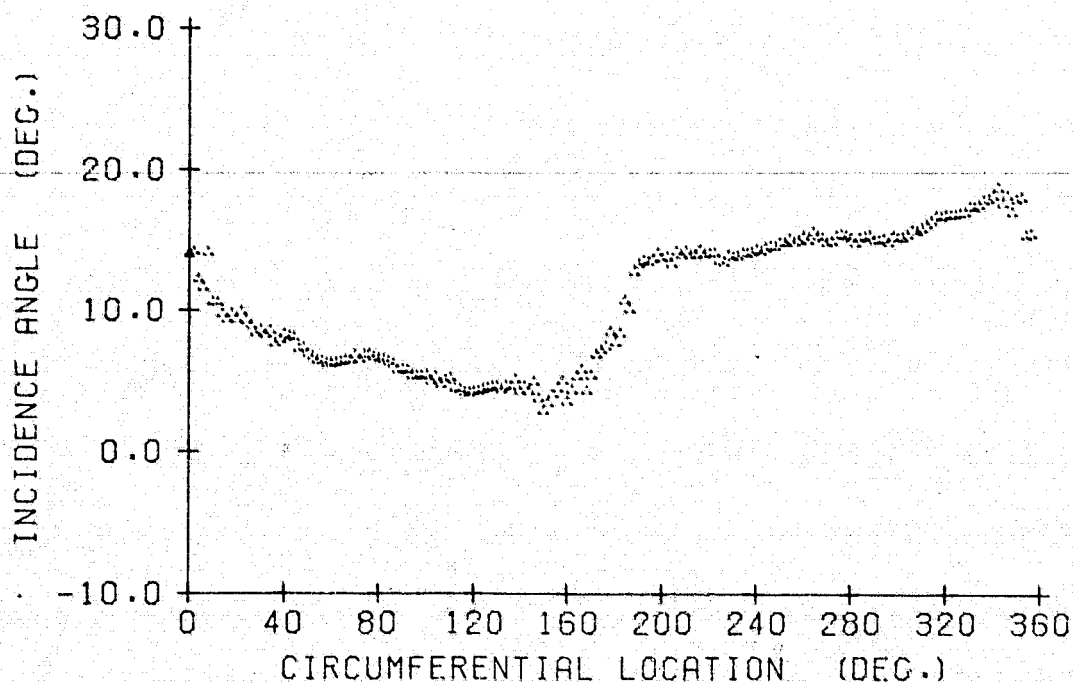


Figure G.12

10 October 1978
LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1130

AVG. FLOW COEF. = 0.866
AVG. P-RISE COEF. = 0.766
AVG. INCIDENCE = 14.18 DEG.

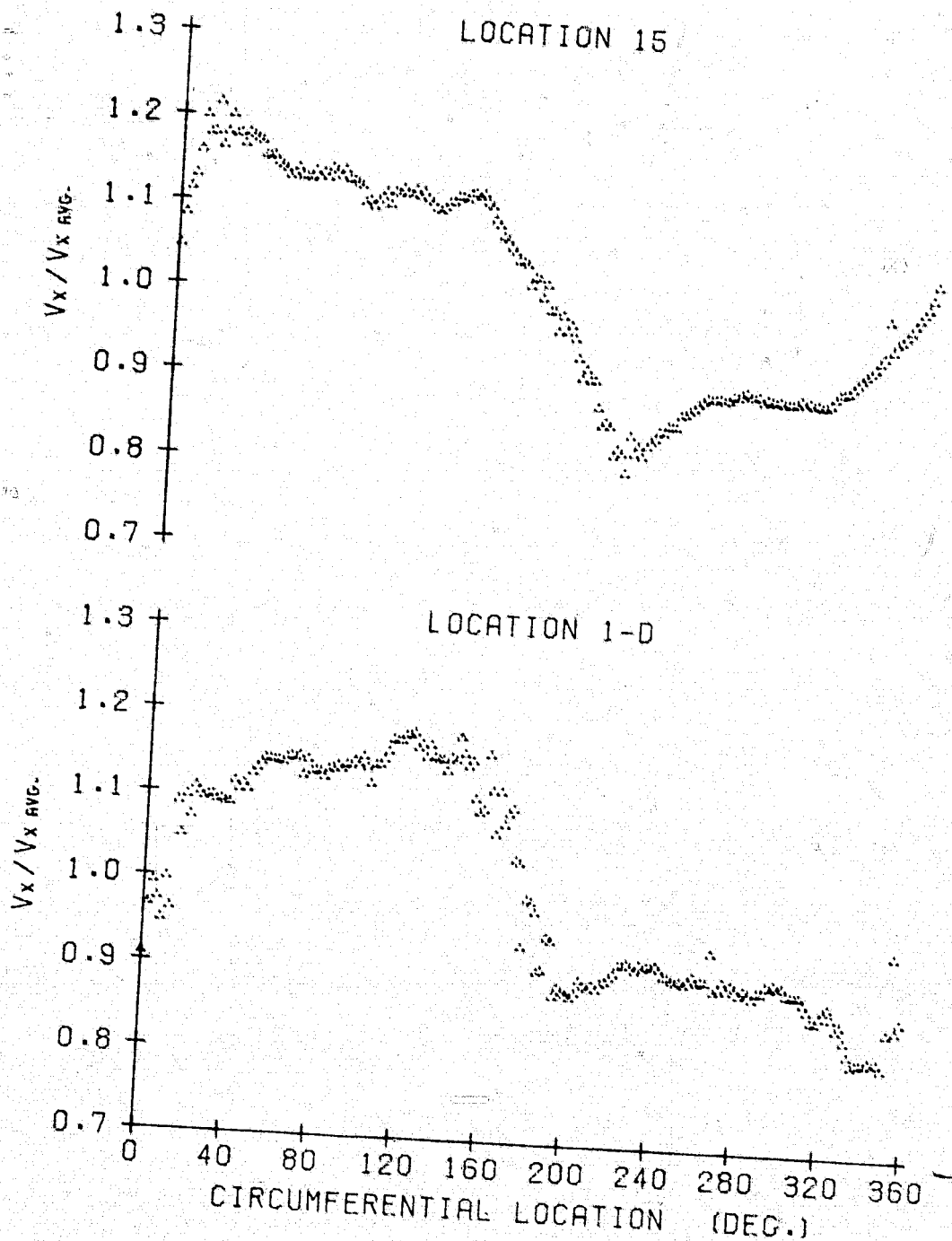


Figure G.13

10 October 1978

LCB:jep

6 BLADES

35 DEG. STAGGER ANGLE

180 DEG. SQ. DISTORTION

RPM = 1138

AVG. FLOW COEF. = 0.866

AVG. P-RISE COEF. = 0.766

AVG. INCIDENCE = 14.18 DEG.

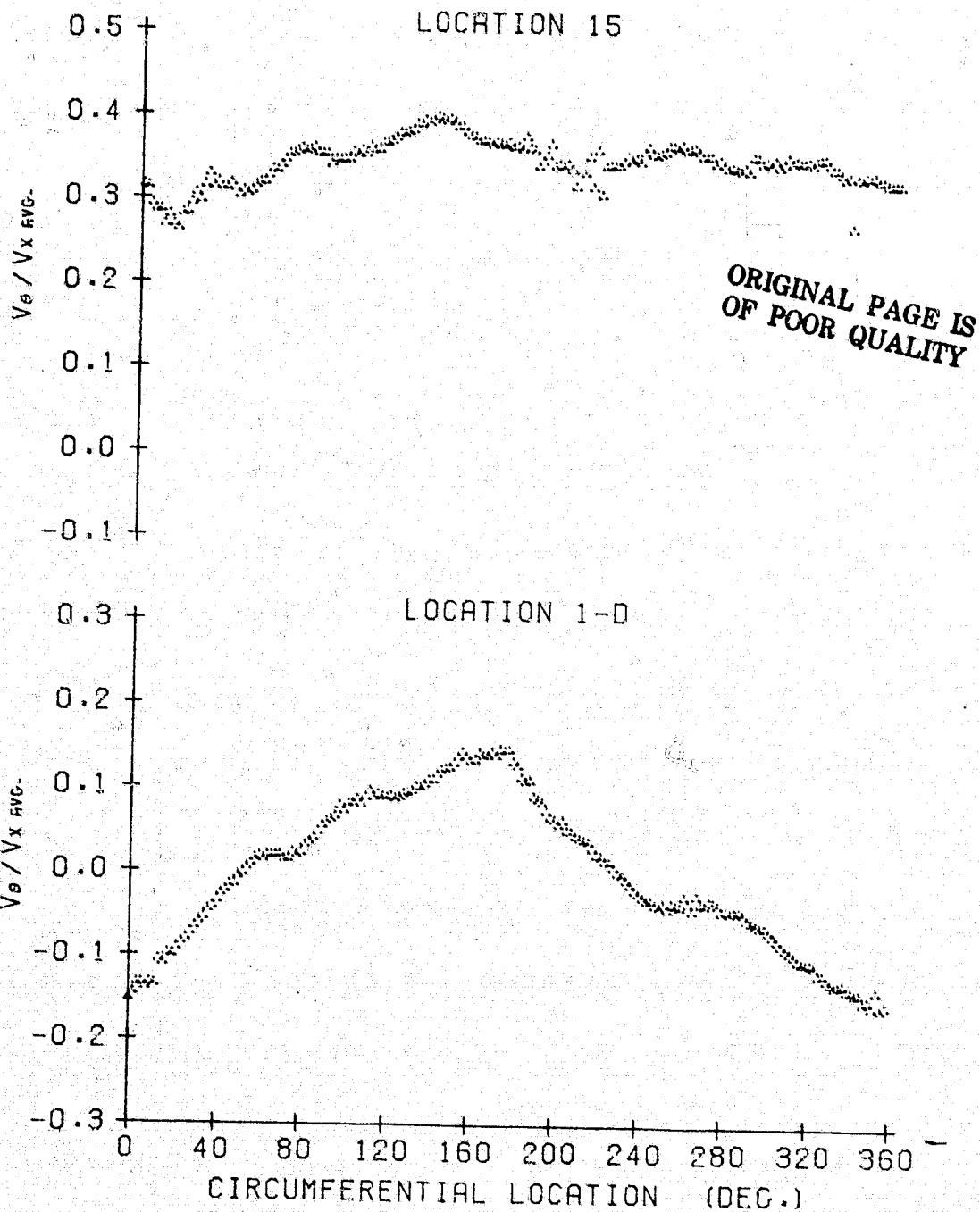


Figure G.14

10 October 1978
LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1138

AVG. FLOW COEF. = 0.866
AVG. P-RISE COEF. = 0.766
AVG. INCIDENCE = 14.18 DEG.

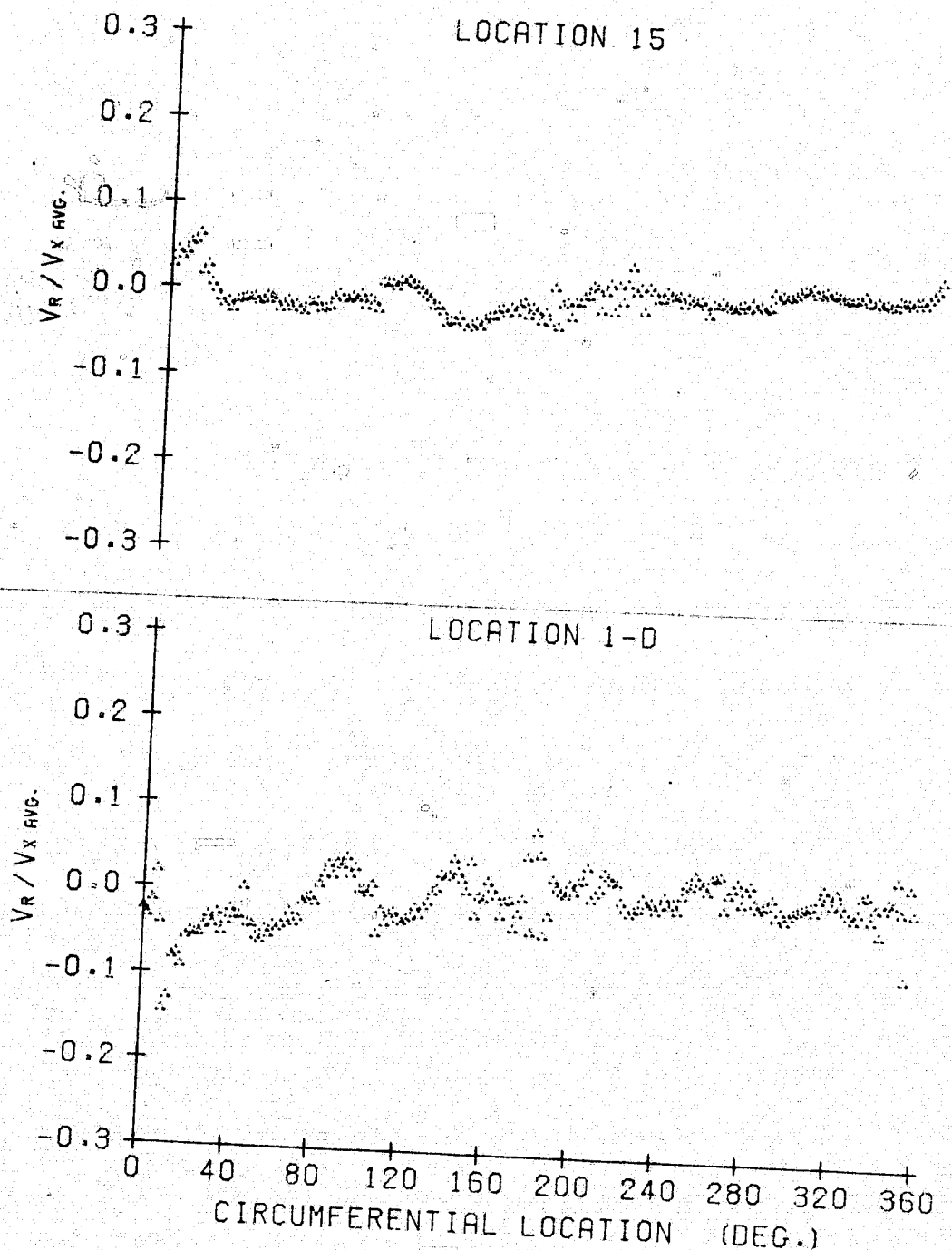


Figure G.15

10 October 1978
LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1138

AVG. FLOW COEFF. = 0.866
AVG. P-RISE COEFF. = 0.766
AVG. INCIDENCE = 14.18 DEG.

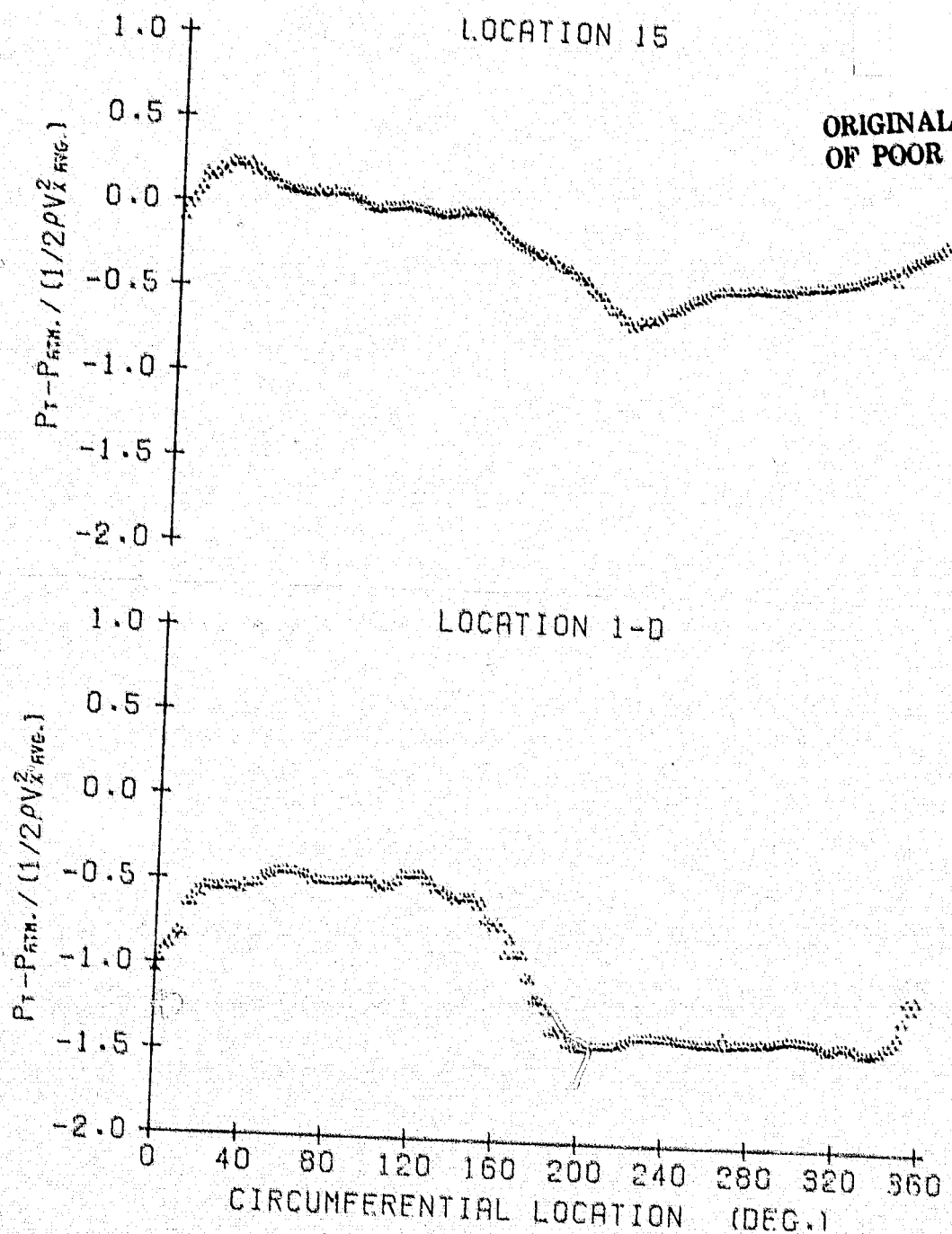


Figure G.16

10 October 1978
LCB:jep

6 BLADES
35 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1138

AVG. FLOW COEF. = 0.866
AVG. P-RISE COEF. = 0.766
AVG. INCIDENCE = 14.18 DEG.

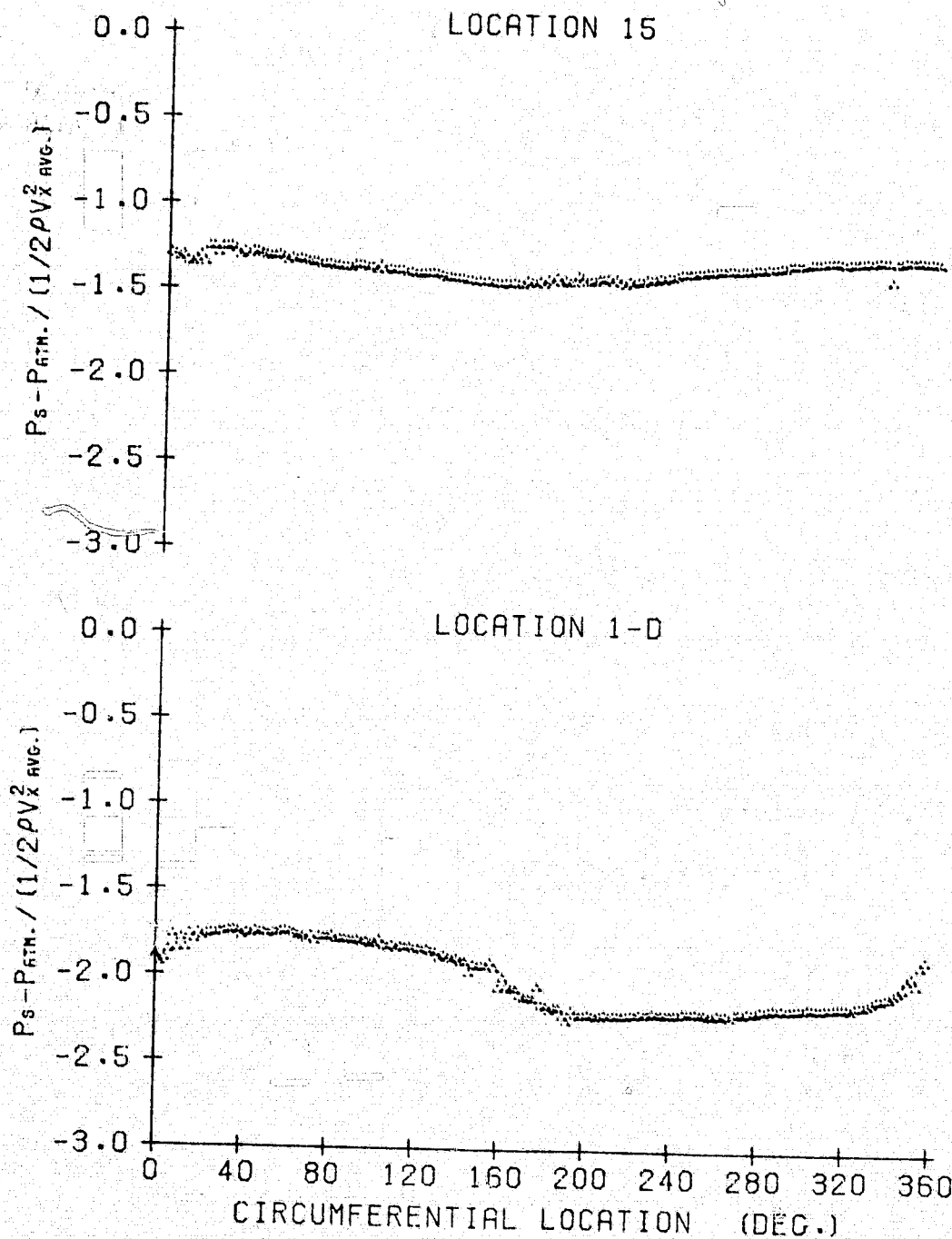


Figure G.17

10 October 1978
LCB:jep

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6 BLADES
35 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1138
AVG. FLOW COEF. = 0.866
AVG. P-RISE COEF. = 0.766
AVG. INCIDENCE = 14.18 DEG.

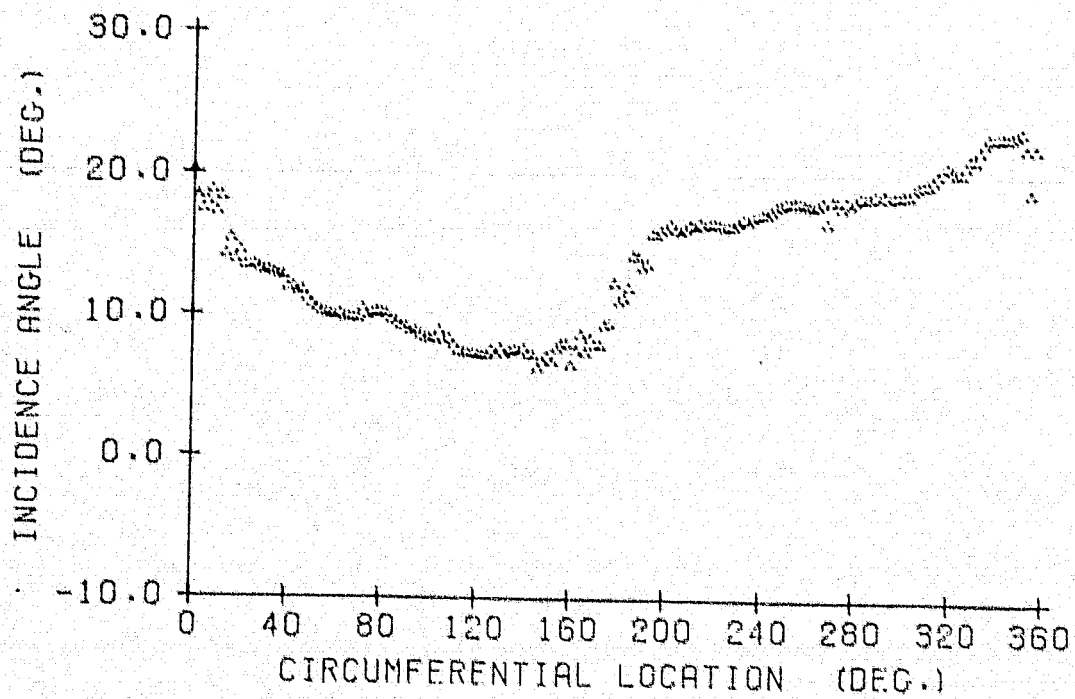


Figure G.18

10 October 1978
LCB:jep

6 BLADES
45 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 989

AVG. FLOW COEF. = 0.951
AVG. P-RISE COEF. = 0.054
AVG. INCIDENCE = 1.57 DEG.

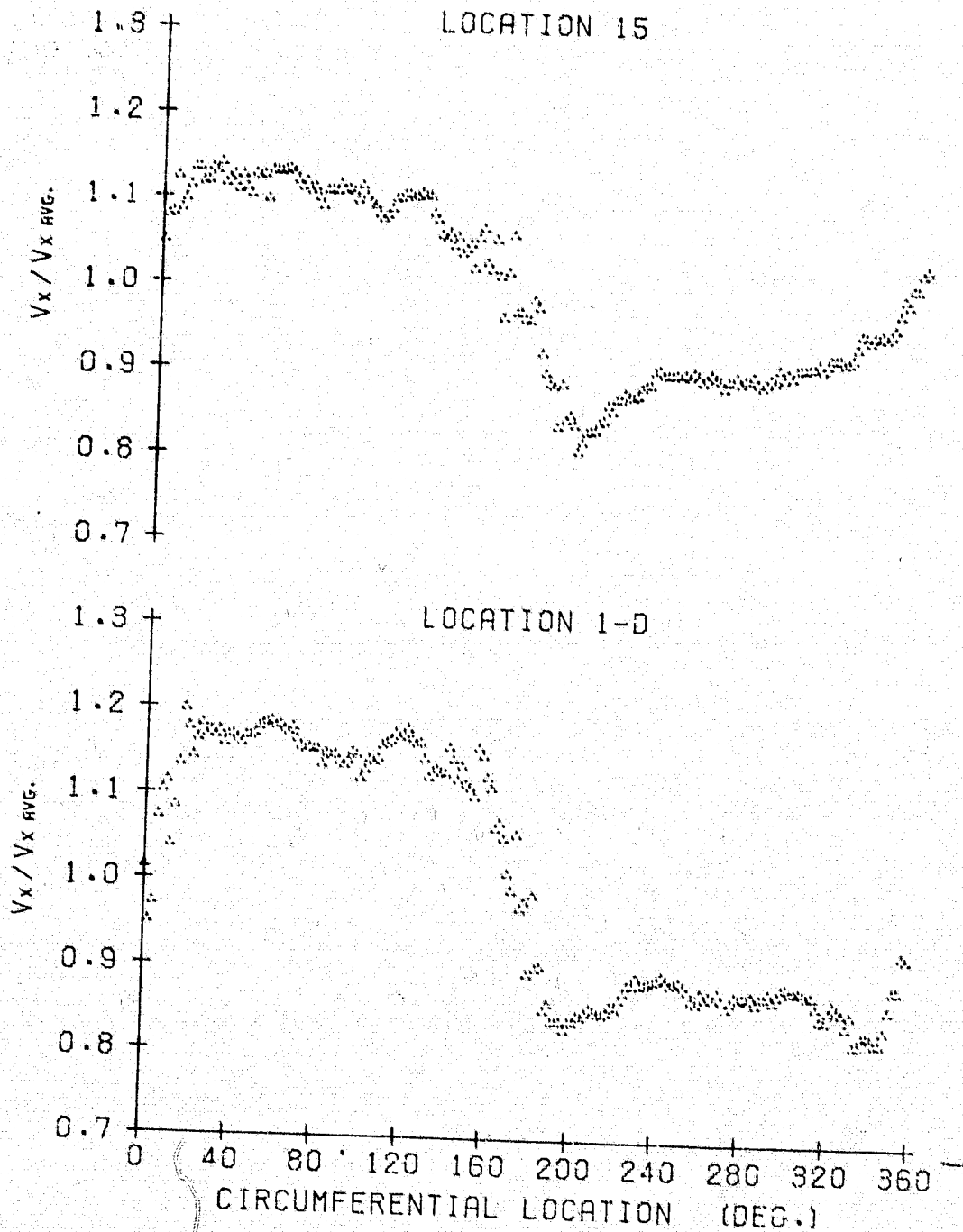


Figure G.19

10 October 1978
LCB:jep

6 BLADES
45 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 989

AVG. FLOW COEF. = 0.951
AVG. P-RISE COEF. = 0.054
AVG. INCIDENCE = 1.57 DEG.

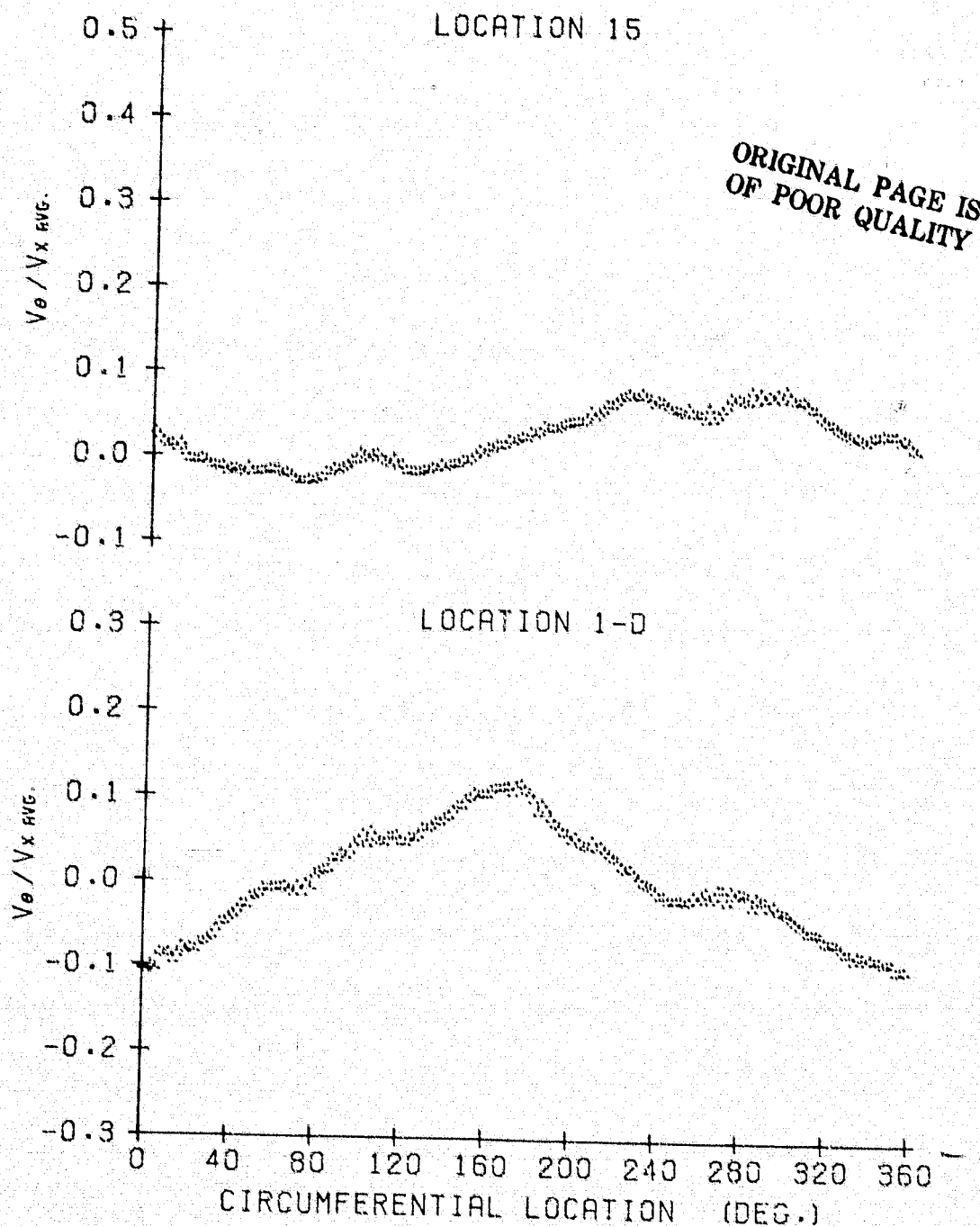


Figure G.20

10 October 1978
LCB:jep

6 BLADES
45 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 989

AVG. FLOW COEF. = 0.951
AVG. P-RISE COEF. = 0.054
AVG. INCIDENCE = 1.57 DEG.

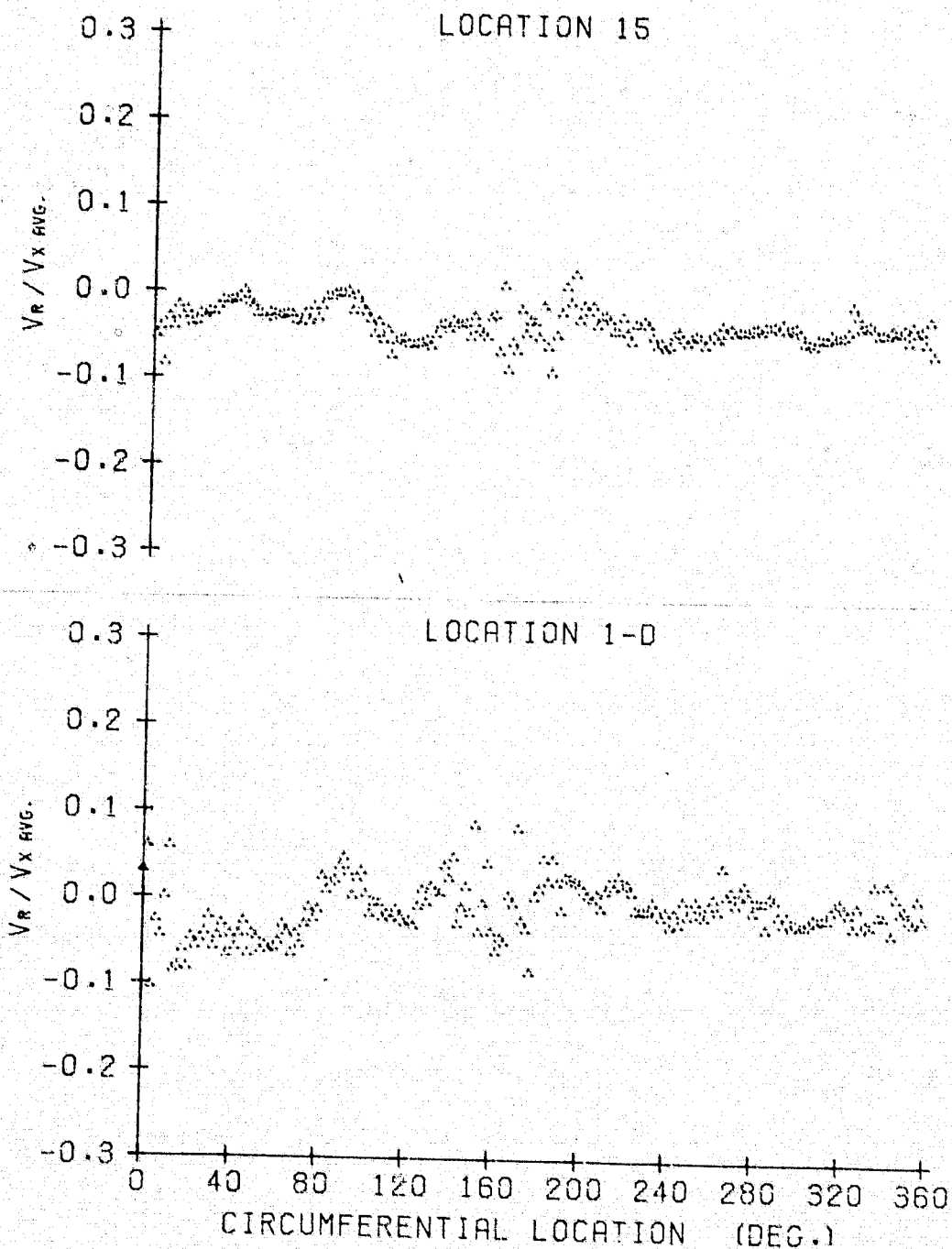


Figure G.21

10 October 1978
LCB:jep

6 BLADES
45 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 989

AVG. FLOW COEF. = 0.951
AVG. P-RISE COEF. = 0.054
AVG. INCIDENCE = 1.57 DEG.

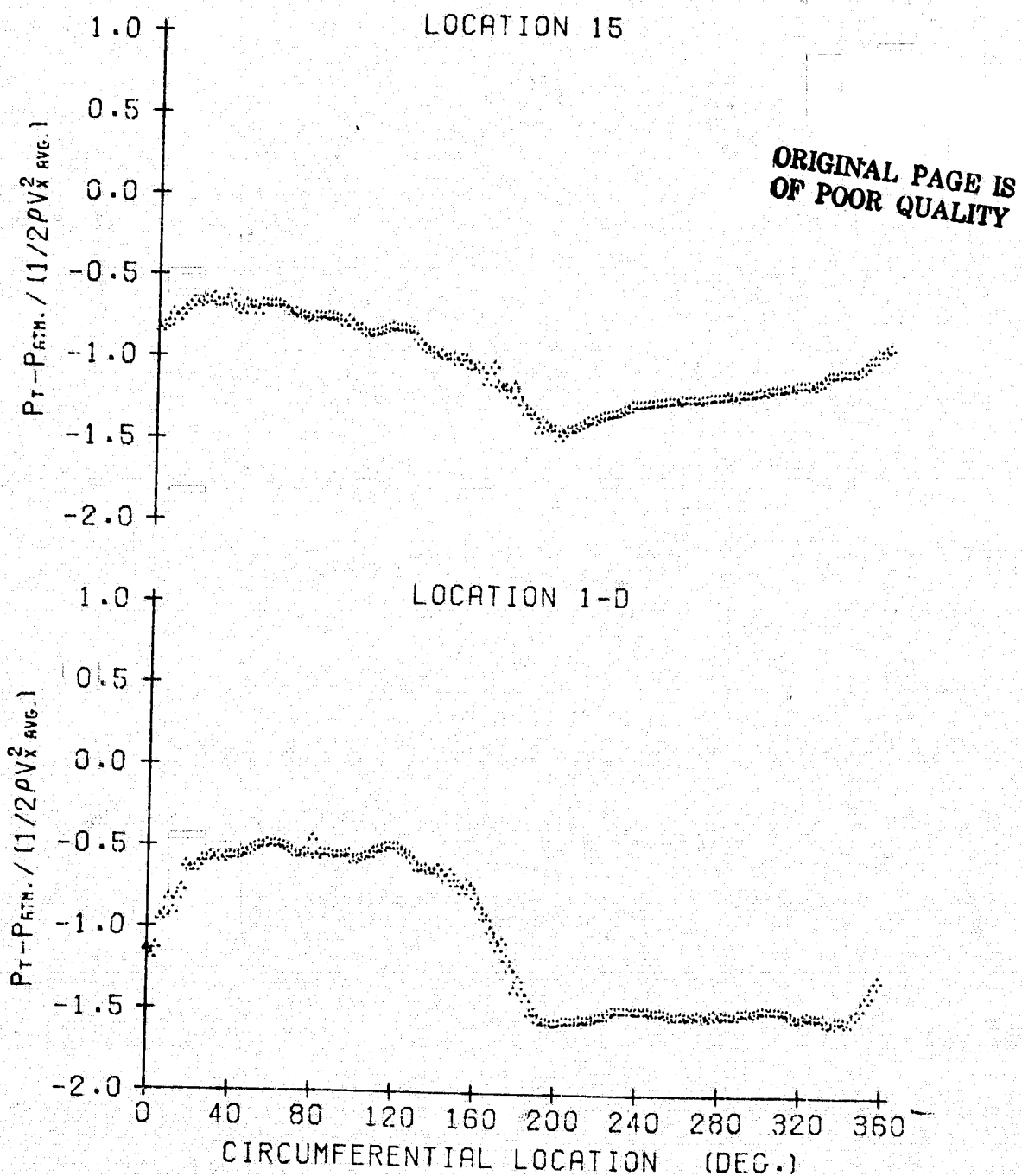


Figure G.22

10 October 1978
LCB:jep

6 BLADES
45 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 989

AVG. FLOW COEF. = 0.951
AVG. P-RISE COEF. = 0.054
AVG. INCIDENCE = 1.57 DEG.

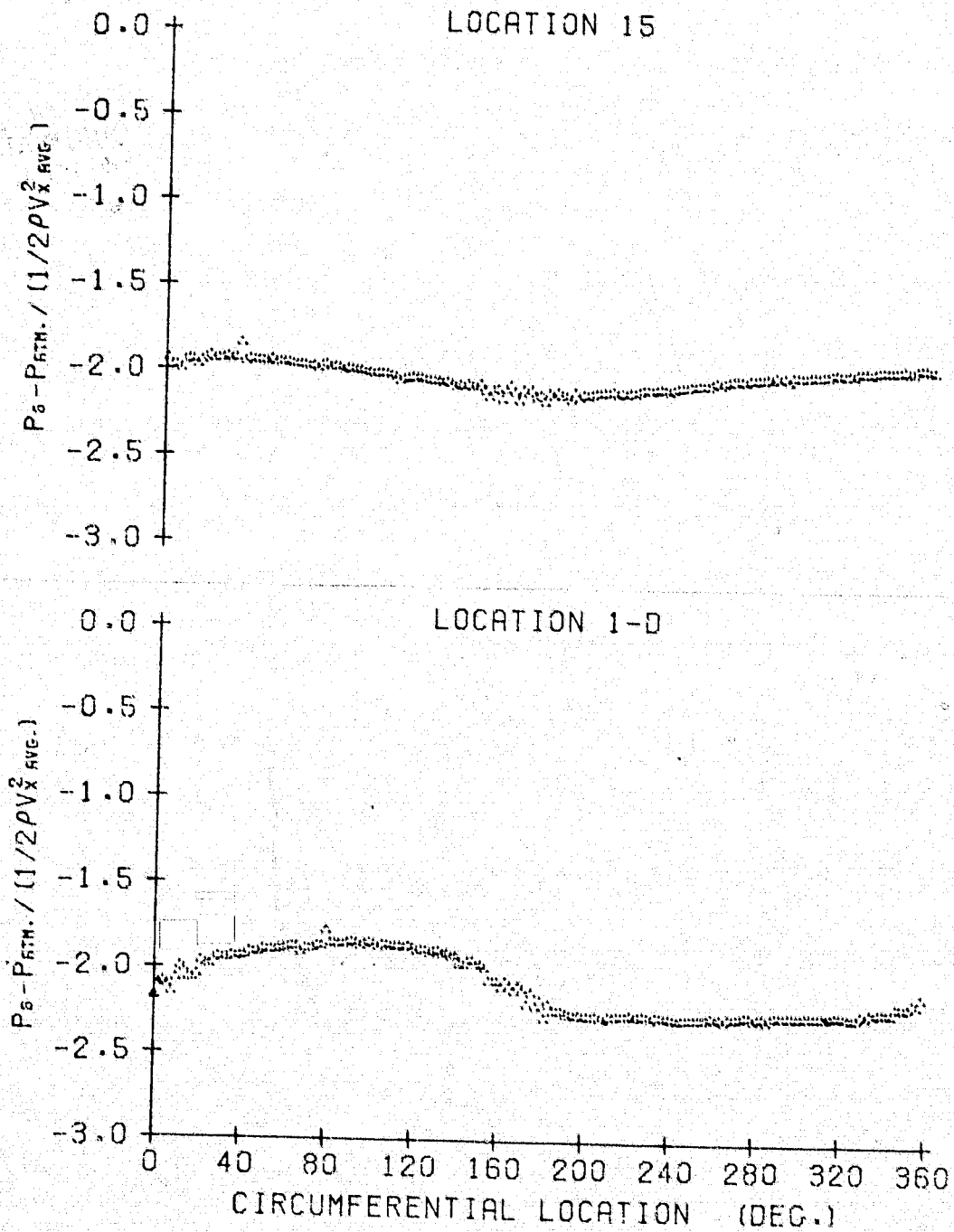


Figure G.23

10 October 1978
LCB:jep

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6 BLADES
45 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 989
AVG. FLOW COEF. = 0.951
AVG. P-RISE COEF. = 0.054
AVG. INCIDENCE = 1.57 DEG.

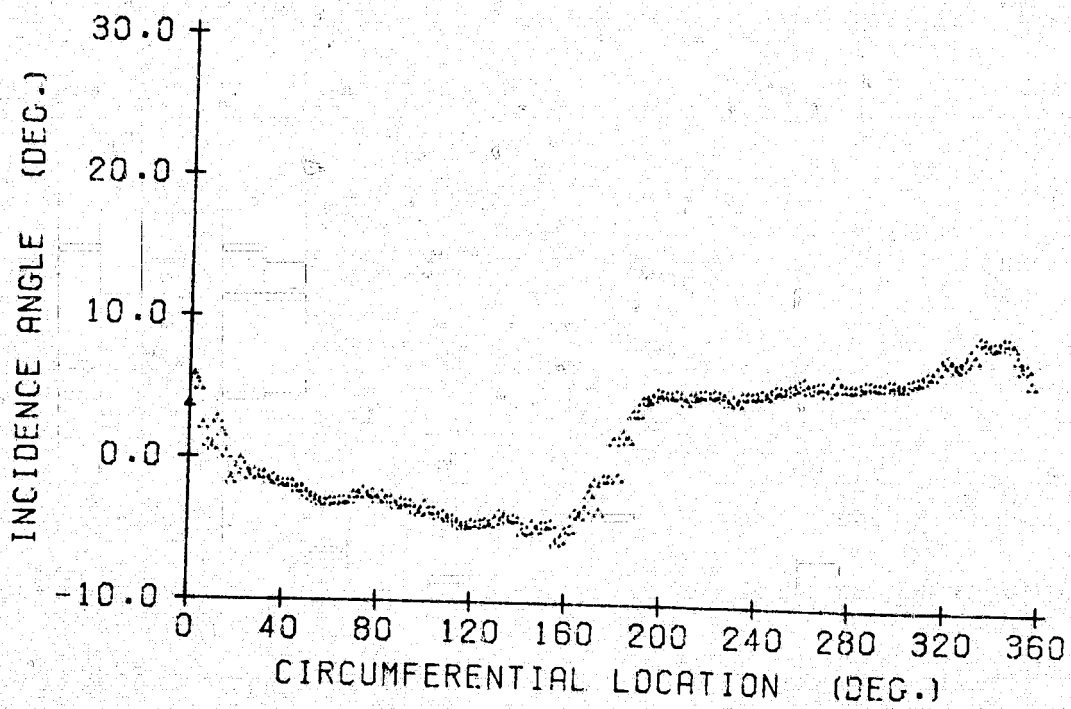


Figure G.24

10 October 1978
LCB:jep

6 BLADES
45 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1328

AVG. FLOW COEF. = 0.717
AVG. P-RISE COEF. = 0.755
AVG. INCIDENCE = 9.41 DEG.

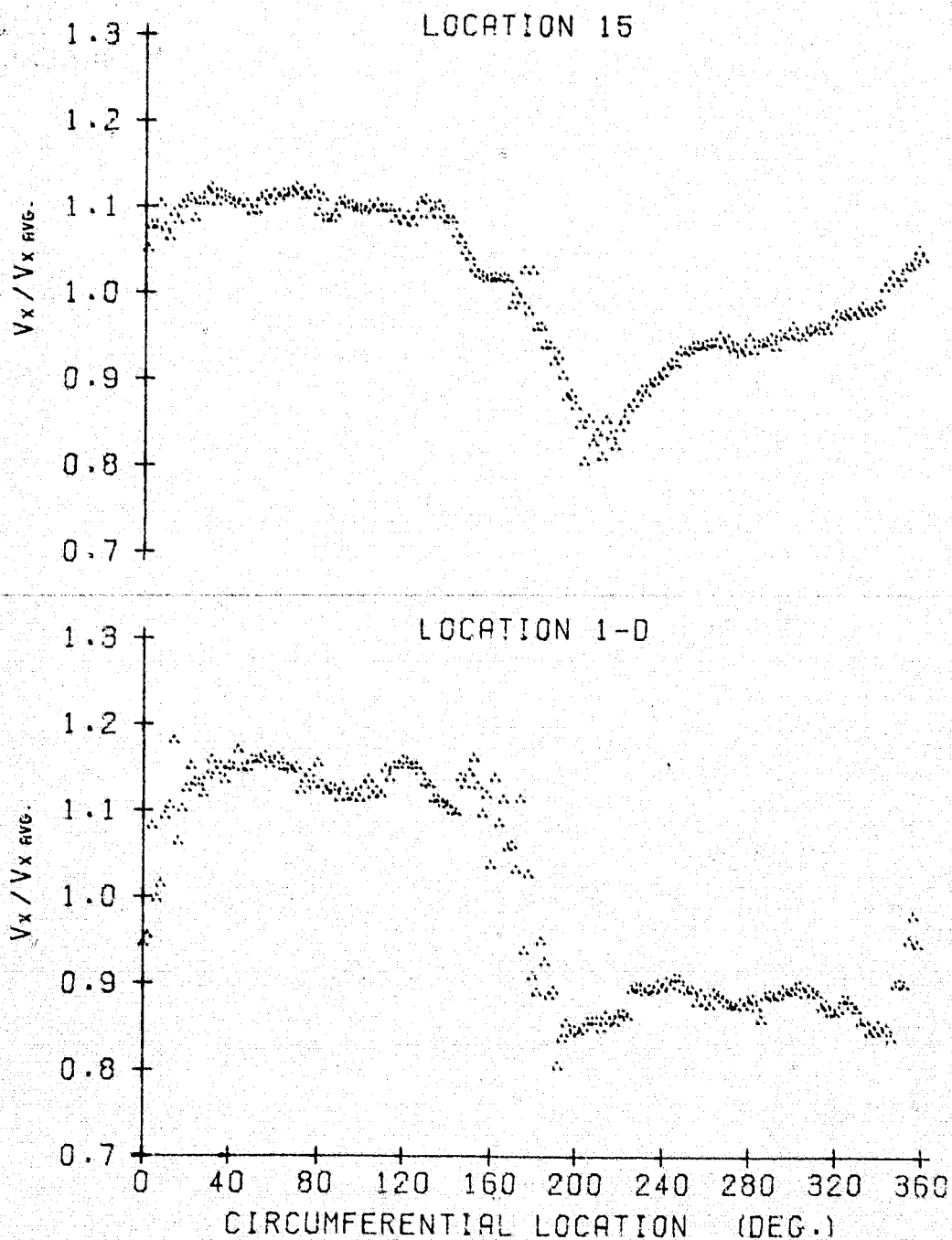


Figure G.25

10 October 1978
LCB:jep

6 BLADES
45 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1328

AVG. FLOW COEF. = 0.717
AVG. P-RISE COEF. = 0.755
AVG. INCIDENCE = 9.41 DEG.

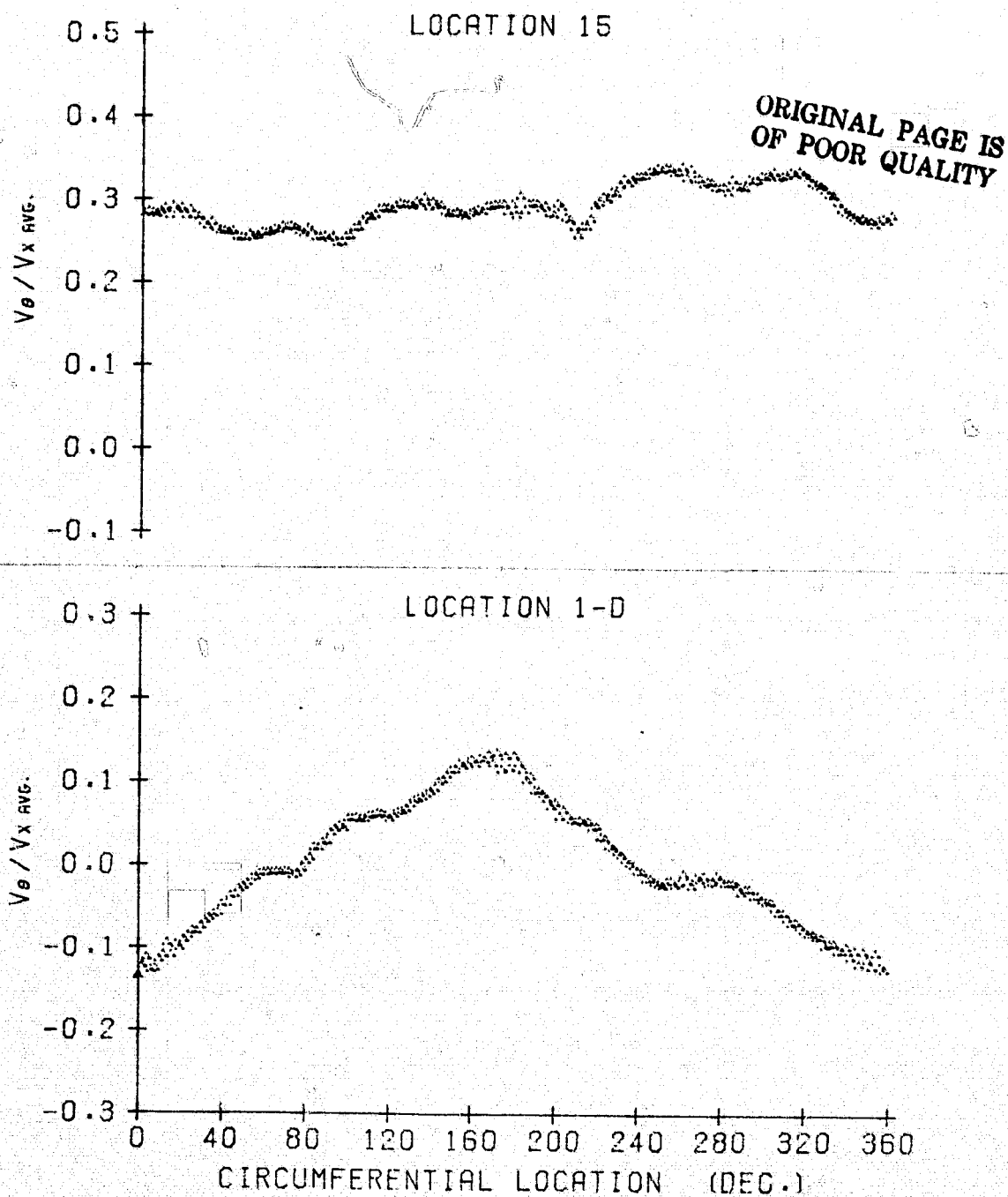


Figure G.26

10 October 1978
LCB:jep

6 BLADES
45 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1328

AVG. FLOW COEF. = 0.717
AVG. P-RISE COEF. = 0.755
AVG. INCIDENCE = 9.41 DEG.

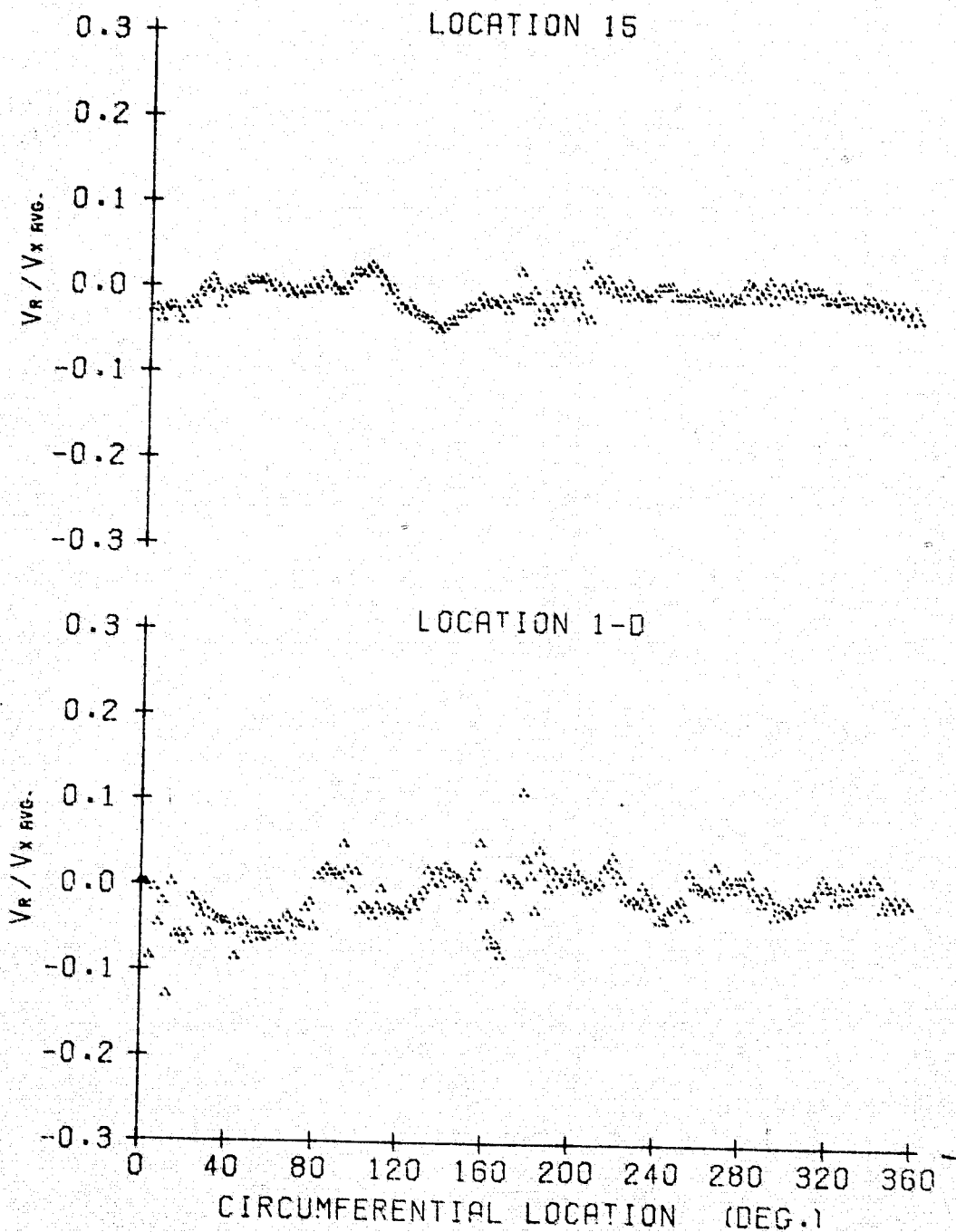


Figure G.27

10 October 1978
LCB:jep

6 BLADES
45 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1328

AVG. FLOW COEF. = 0.717
AVG. P-RISE COEF. = 0.755
AVG. INCIDENCE = 9.41 DEG.

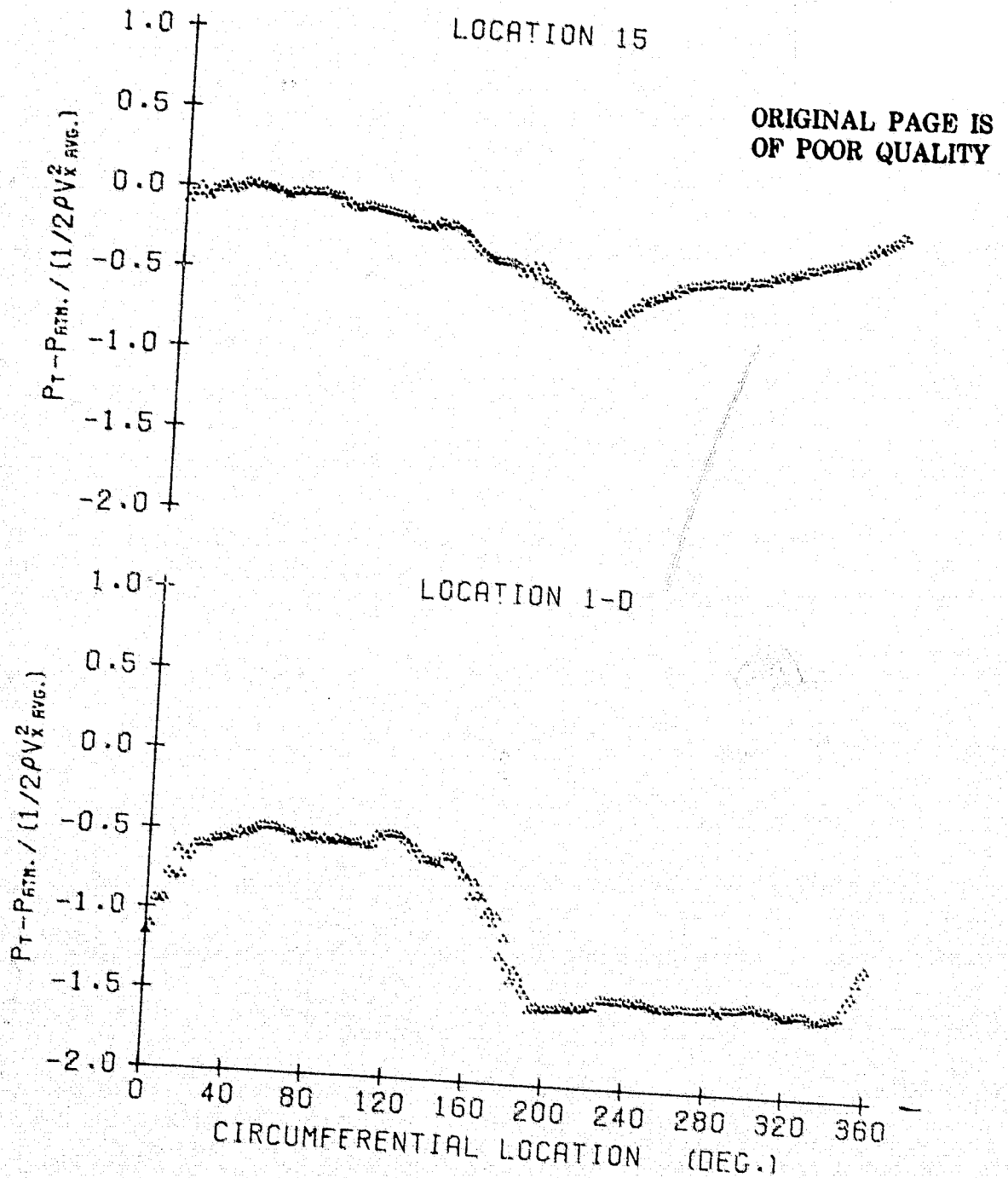


Figure G.28

10 October 1978

LCB:jep

6 BLADES

AVG. FLOW COEF. = 0.717

45 DEG. STAGGER ANGLE

AVG. P-RISE COEF. = 0.755

180 DEG. SQ. DISTORTION

AVG. INCIDENCE = 9.41 DEG.

RPM = 1328

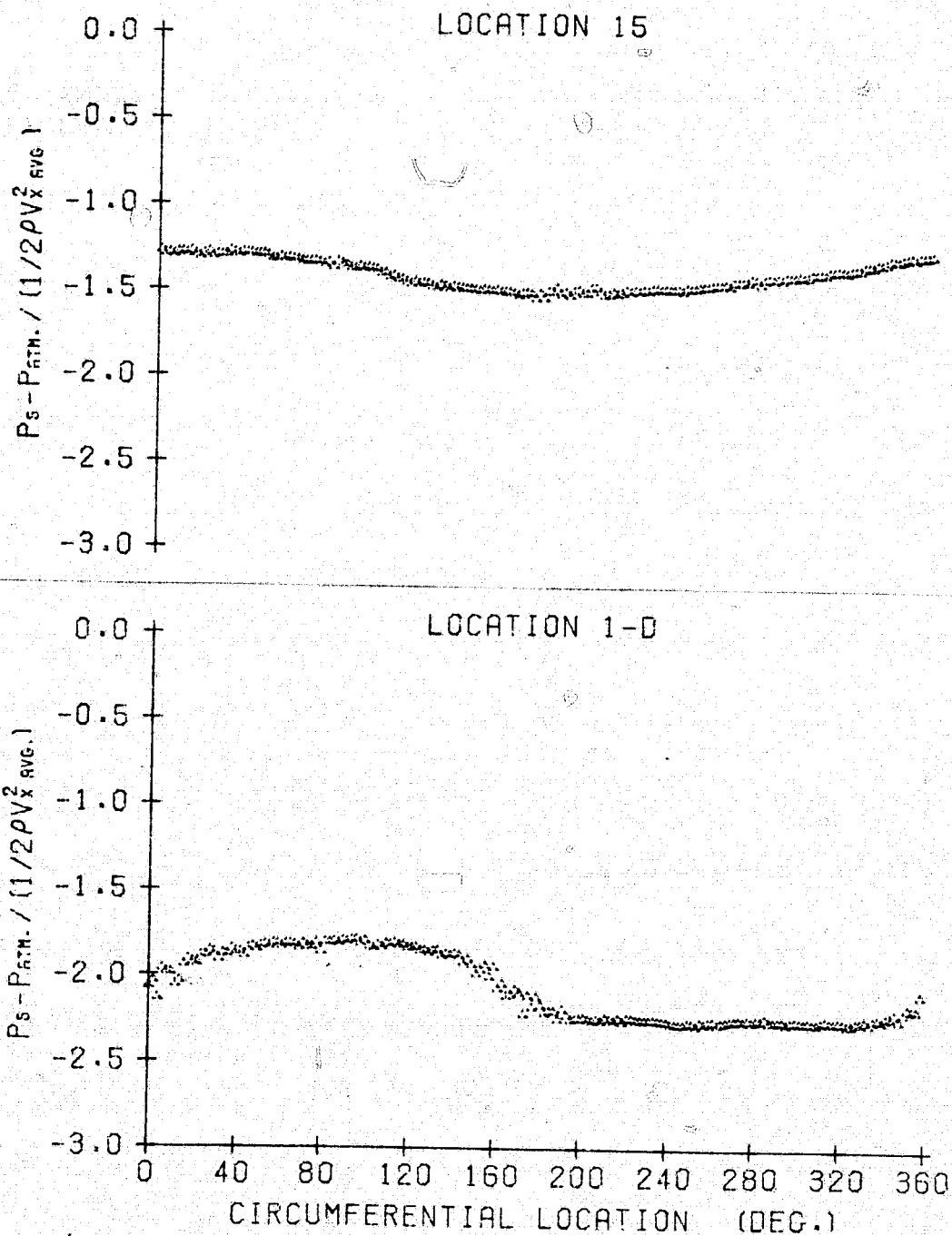


Figure G.29

10 October 1978
LCB:jep

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6 BLADES
45 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1328
AVG. FLOW COEF. = 0.717
AVG. P-RISE COEF. = 0.755
AVG. INCIDENCE = 9.41 DEG.

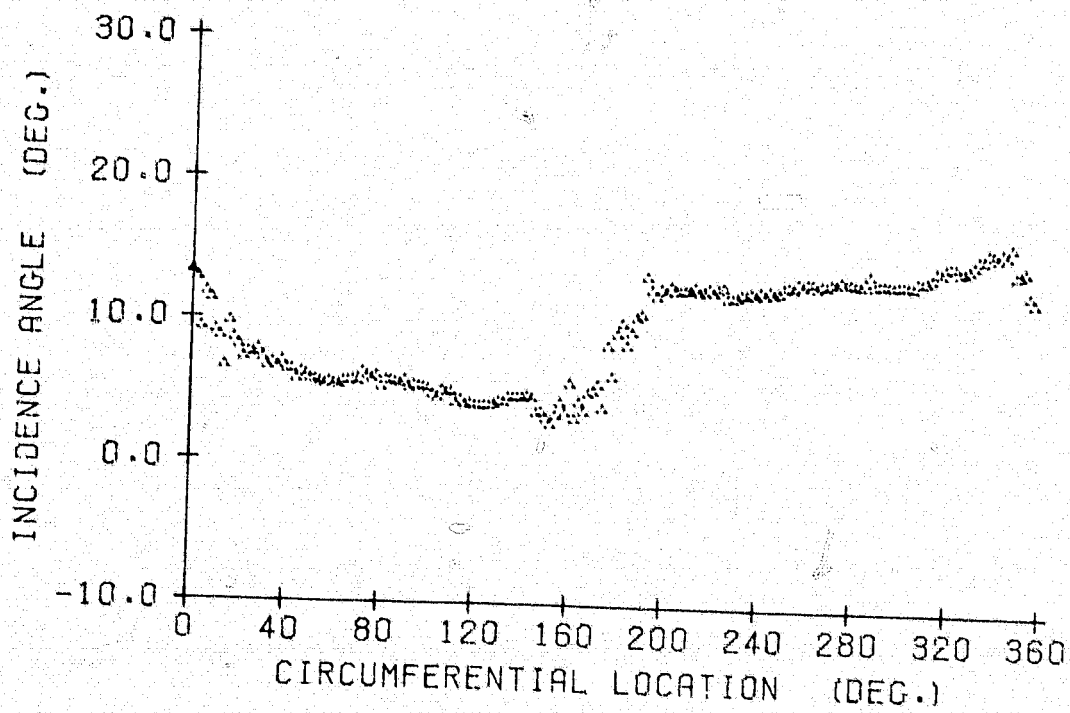


Figure G.30

-470-

10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1412

AVG. FLOW COEFF. = 0.634
AVG. P-RISE COEFF. = 0.148
AVG. INCIDENCE = 2.18 DEG.

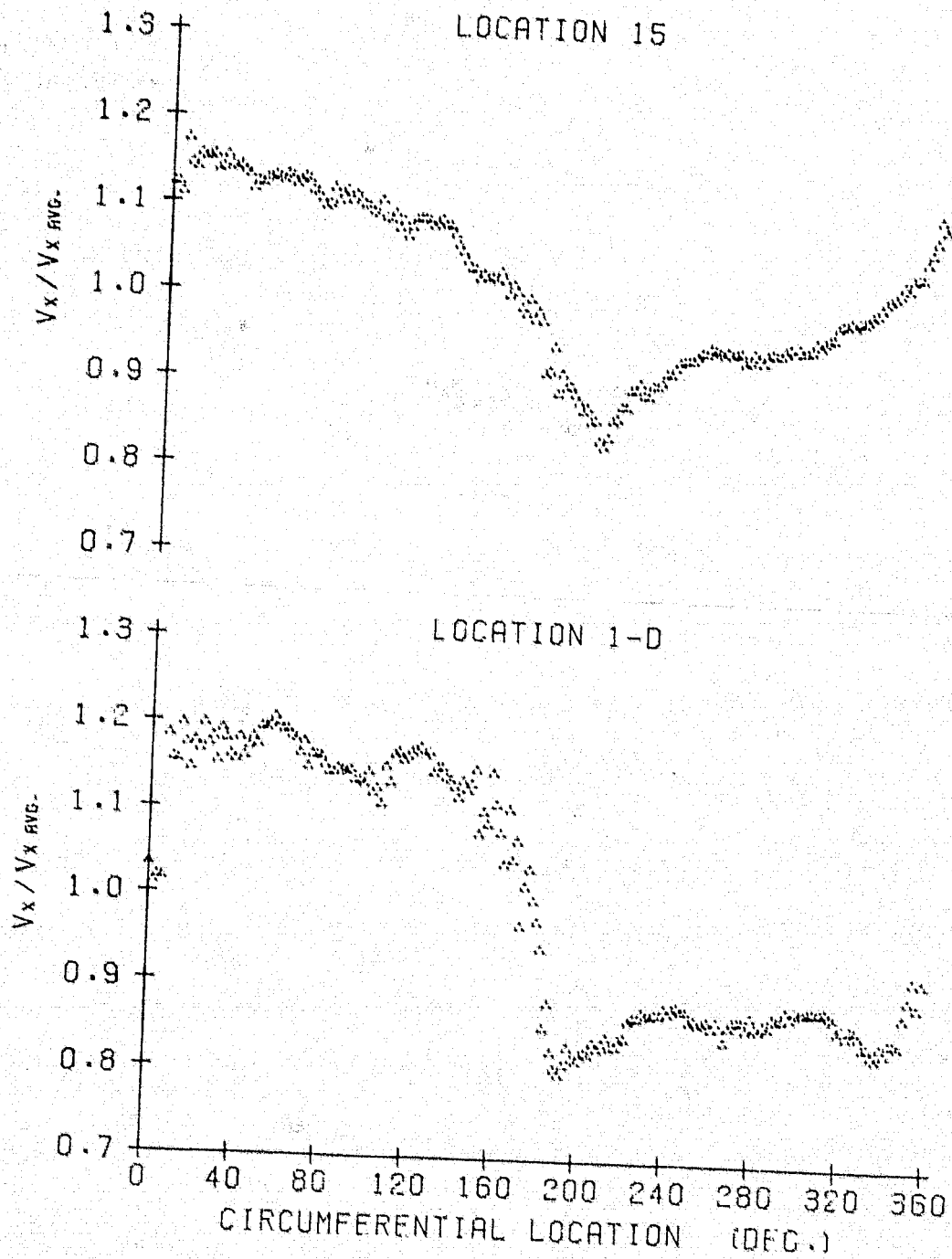


Figure G.31

6 BLADES
 55 DEG. STAGGER ANGLE
 180 DEG. SQ. DISTORTION
 RPM = 1412

AVG. FLOW COEF. = 0.634
 AVG. P-RISE COEF. = 0.148
 AVG. INCIDENCE = 2.18 DEG.

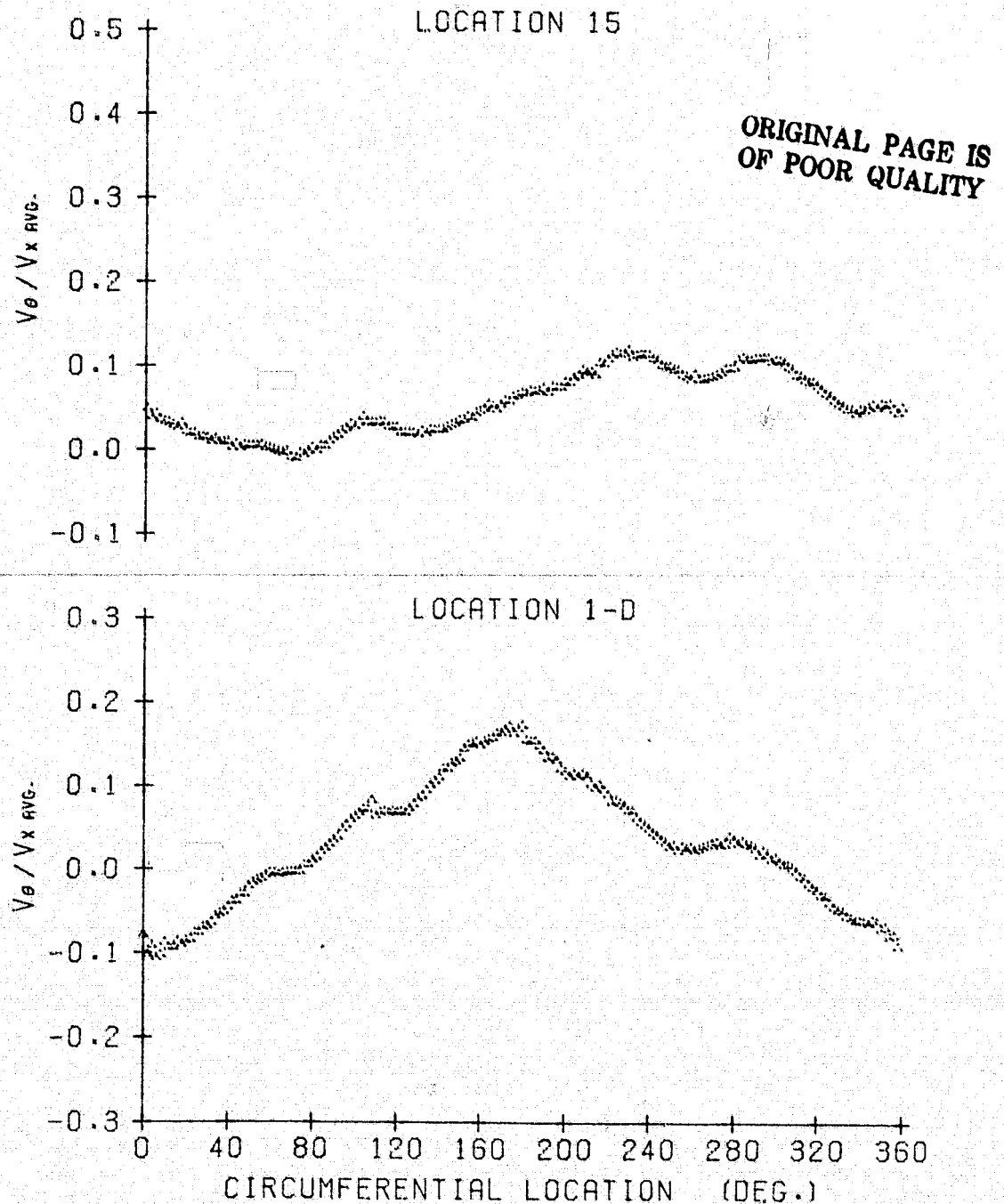


Figure G.32

10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1412

AVG. FLOW COEF. = 0.634
AVG. P-RISE COEF. = 0.148
AVG. INCIDENCE = 2.18 DEG.

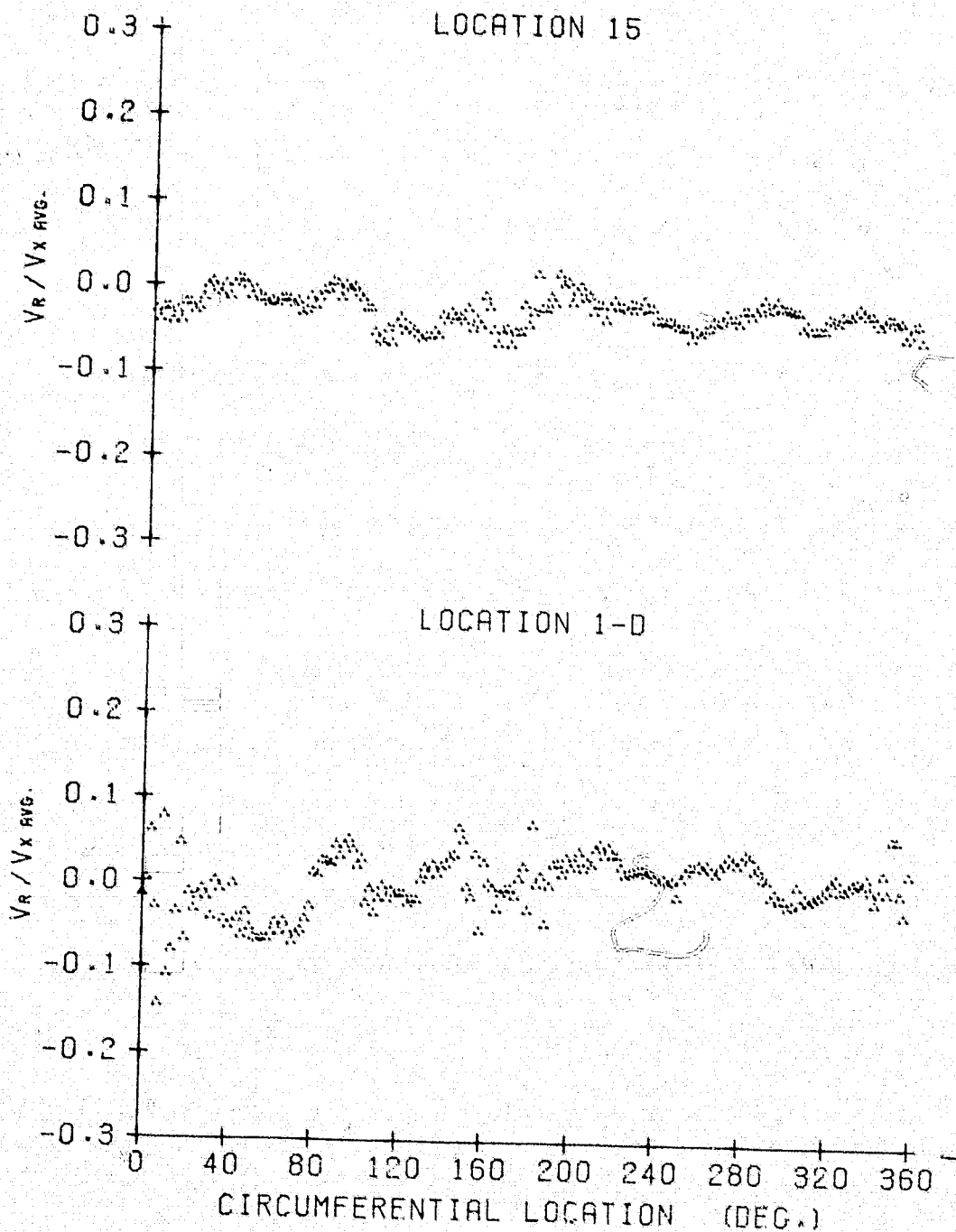


Figure G.33

10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1412

AVG. FLOW COEF. = 0.634
AVG. P-RISE COEFF. = 0.148
AVG. INCIDENCE = 2.18 DEG.

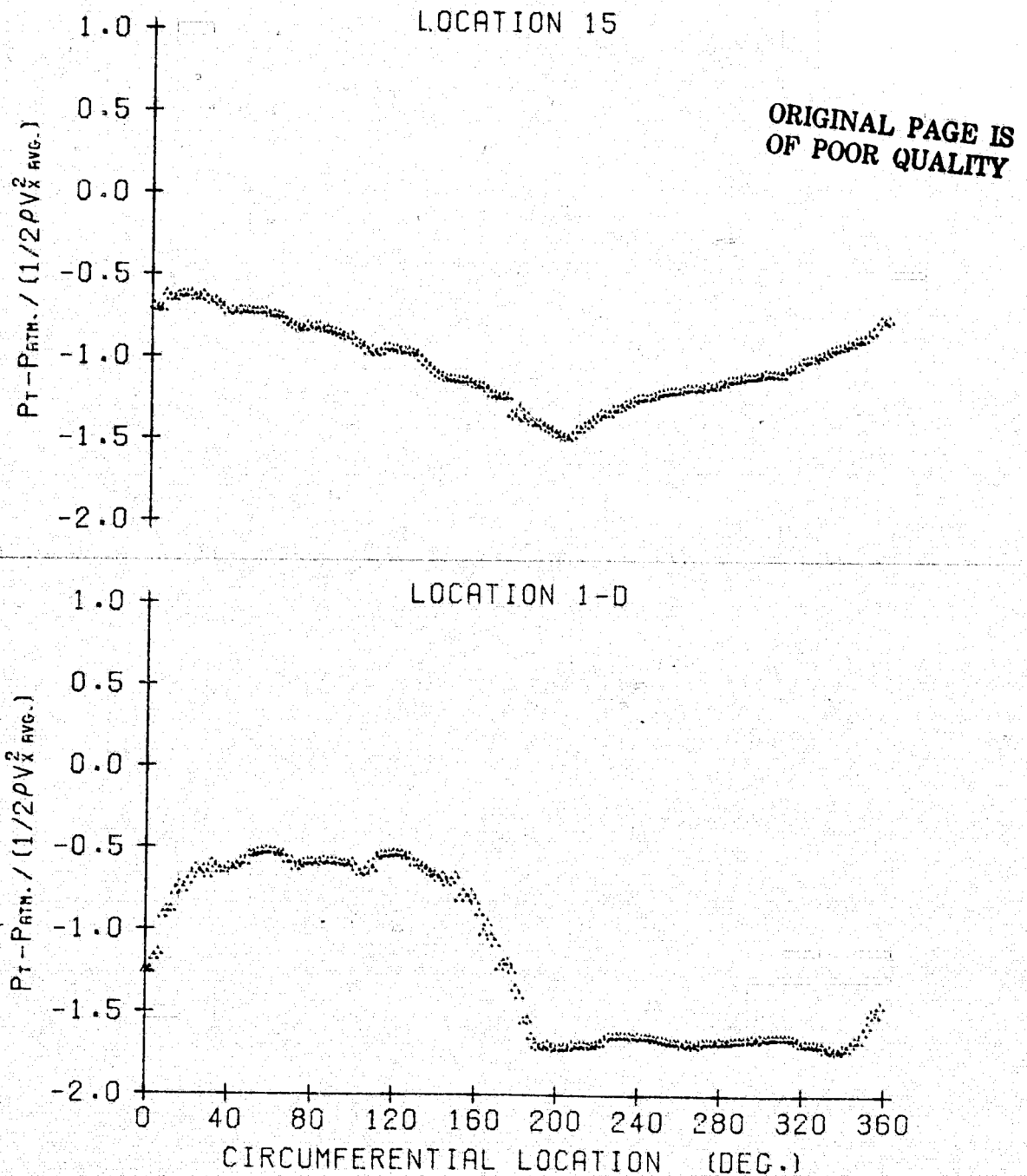


Figure G.34

10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1412
AVG. FLOW COEF. = 0.634
AVG. P-RISE COEF. = 0.148
AVG. INCIDENCE = 2.18 DEG.

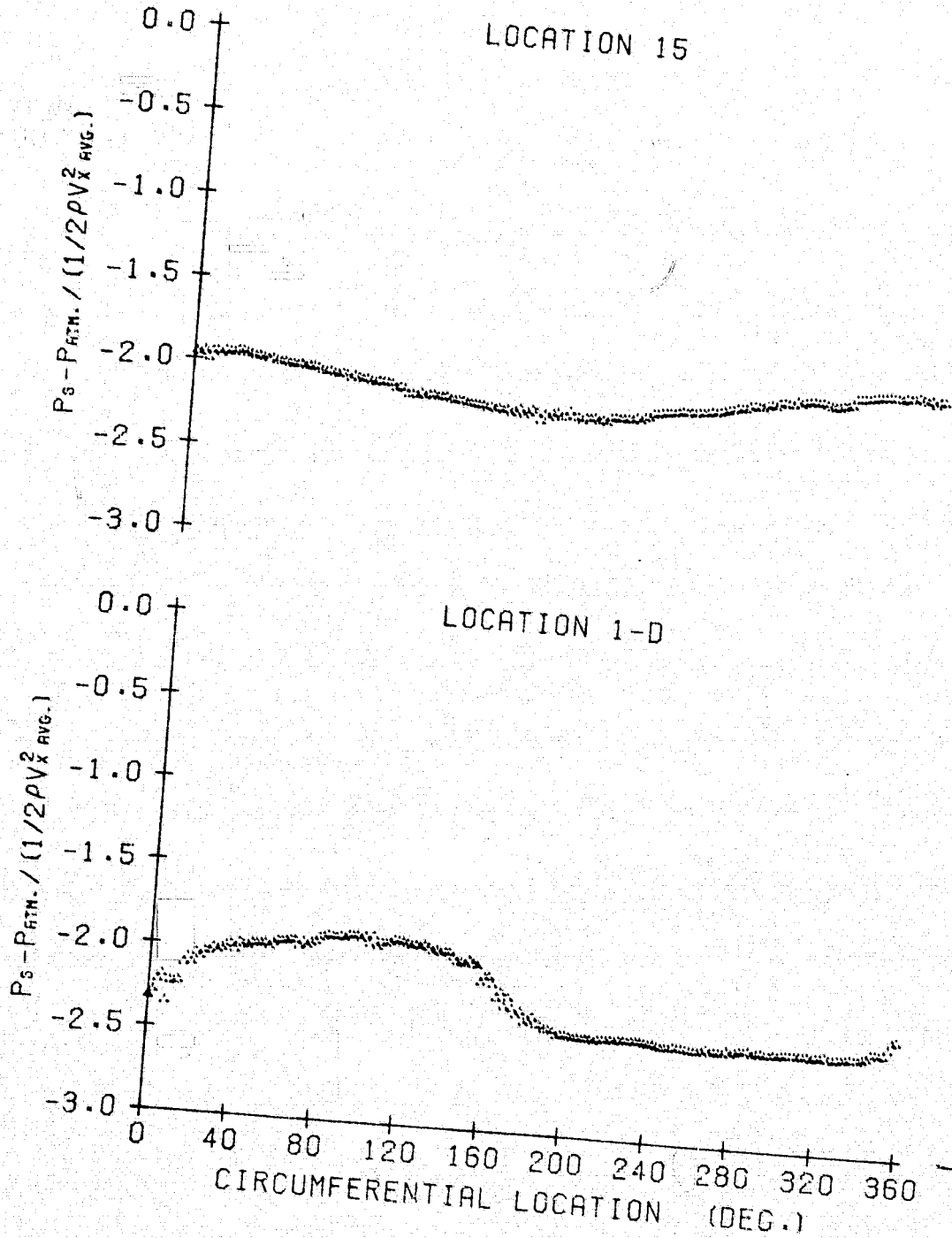


Figure G.35

10 October 1978
LCB:jep

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6 BLADES
55 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1412

AVG. FLOW COEFF. = 0.634
AVG. P-RISE COEF. = 0.148
AVG. INCIDENCE = 2.18 DEG.

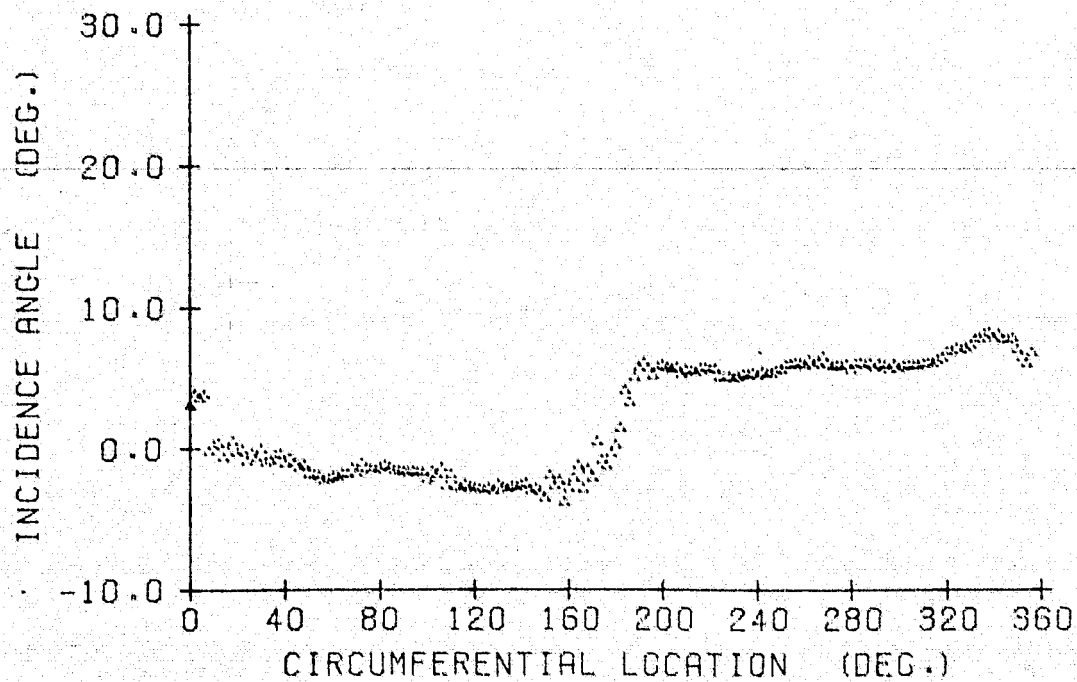


Figure G.36

10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1646

AVG. FLOW COEF. = 0.533
AVG. P-RISE COEF. = 0.801
AVG. INCIDENCE = 6.47 DEG.

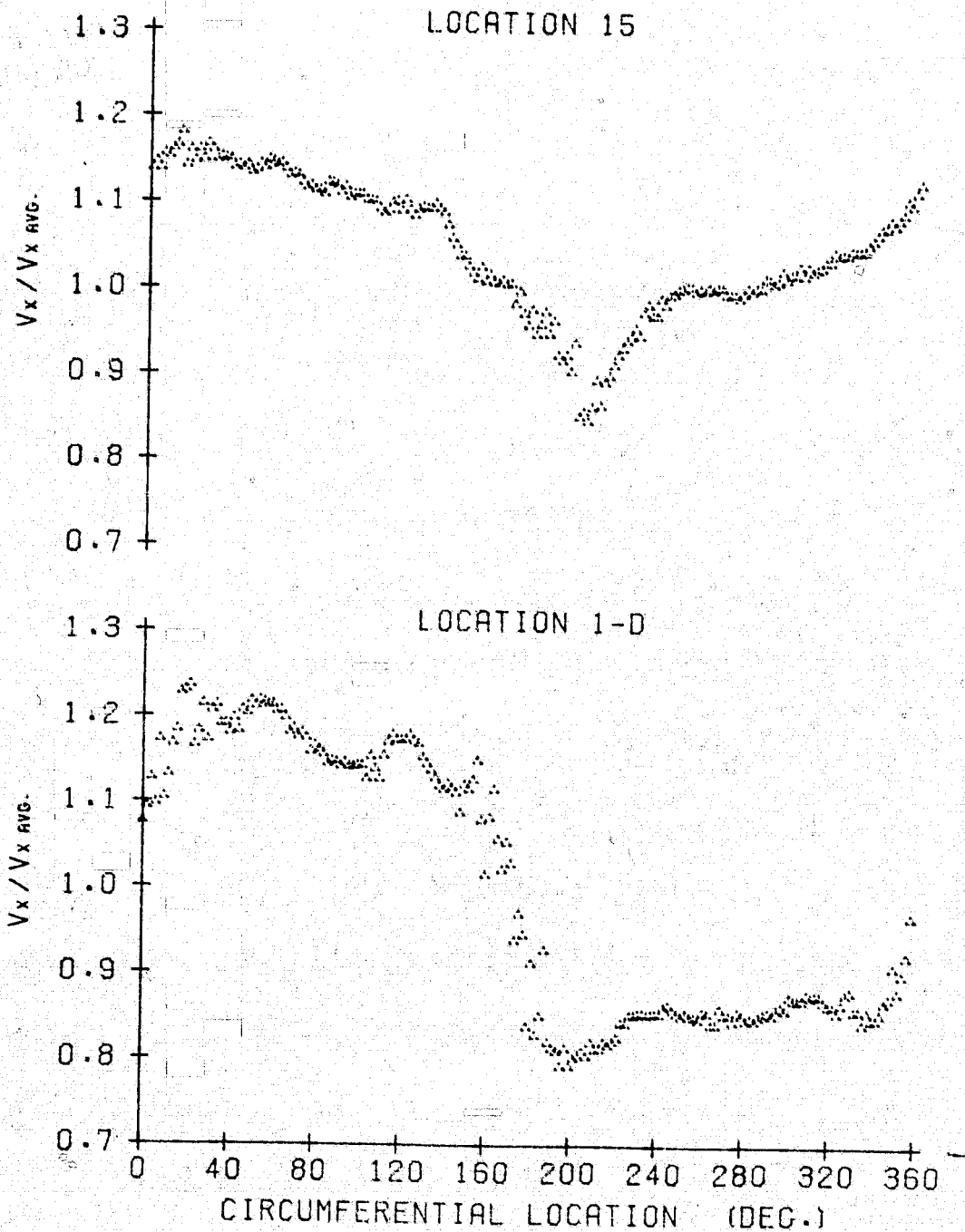


Figure G.37

10 October 1978

LCB:jep

6 BLADES

55 DEG. STAGGER ANGLE

180 DEG. SQ. DISTORTION

RPM = 1646

AVG. FLOW COEFF. = 0.533

AVG. P-RISE COEFF. = 0.801

AVG. INCIDENCE = 6.47 DEG.

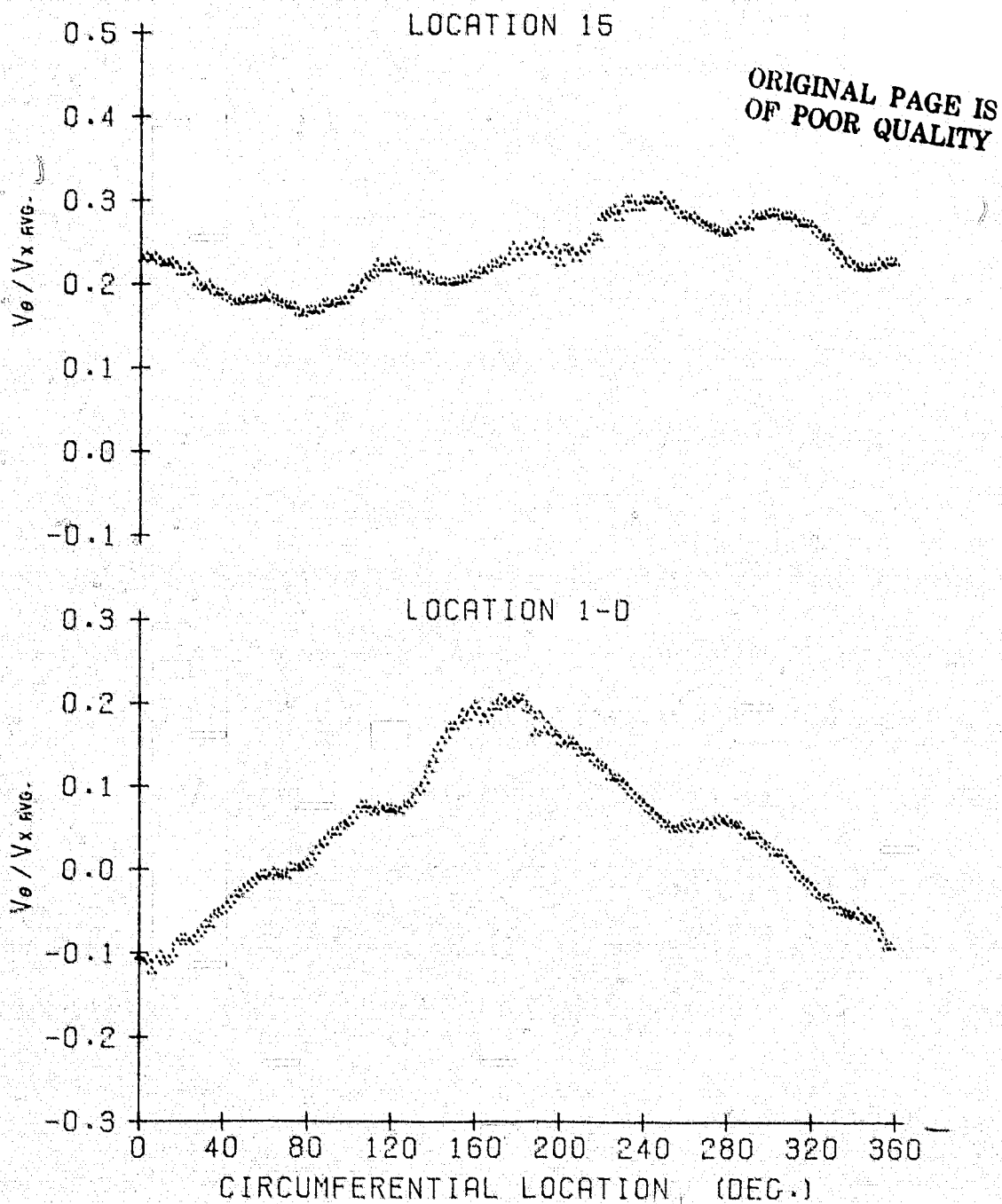


Figure G.38

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10 October 1978
LCB:jep

6 BLADES

55 DEG. STAGGER ANGLE

180 DEG. SQ. DISTORTION

RPM = 1646

AVG. FLOW COEFF. = 0.533

AVG. P-RISE COEFF. = 0.801

AVG. INCIDENCE = 6.47 DEG.

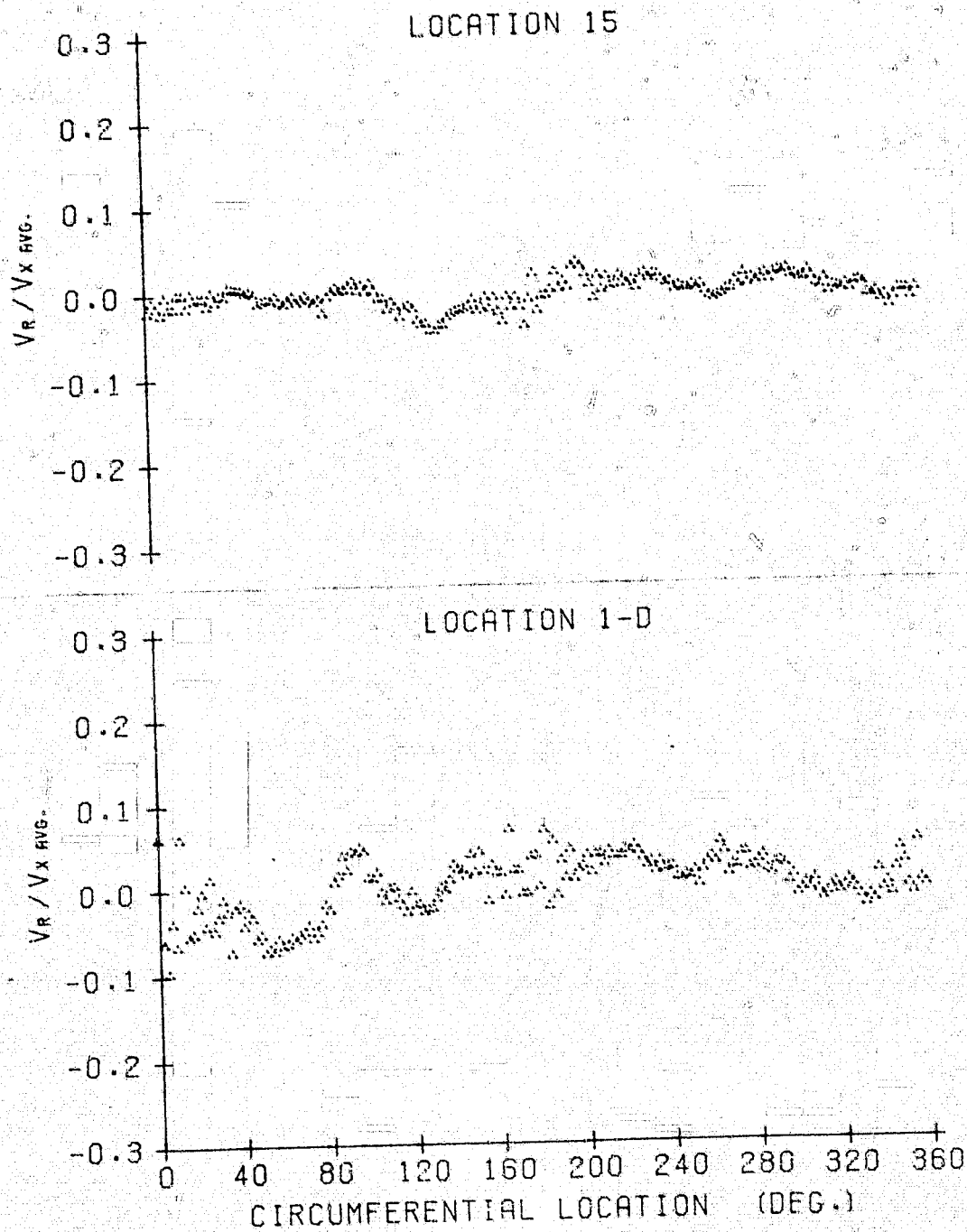


Figure G.39

10 October 1978

LCB:jep

6 BLADES

AVG. FLOW COEF. = 0.533

55 DEG. STAGGER ANGLE

AVG. P-RISE COEF. = 0.801

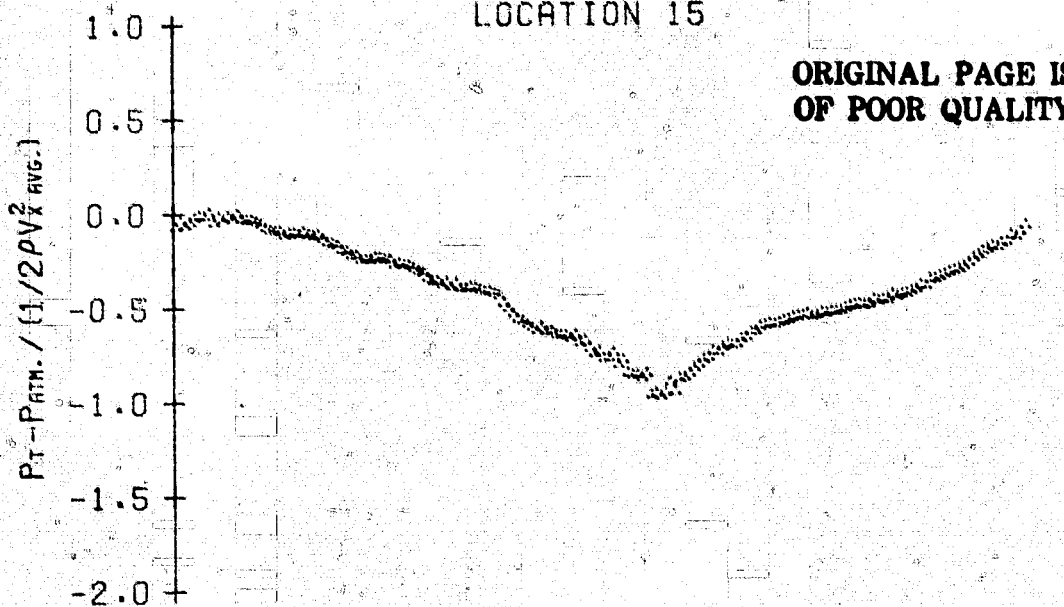
180 DEG. SQ. DISTORTION

AVG. INCIDENCE = 6.47 DEG.

RPM = 1646

LOCATION 15

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LOCATION 1-D

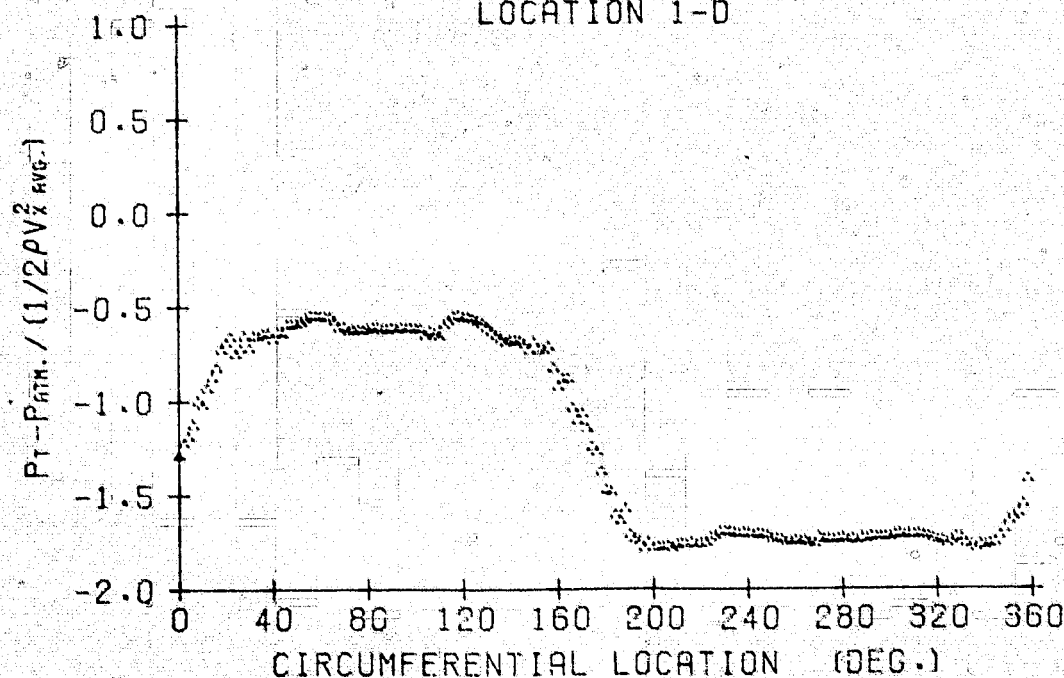


Figure G.40

10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1646

AVG. FLOW COEF. = 0.533
AVG. P-RISE COEF. = 0.801
AVG. INCIDENCE = 6.47 DEG.

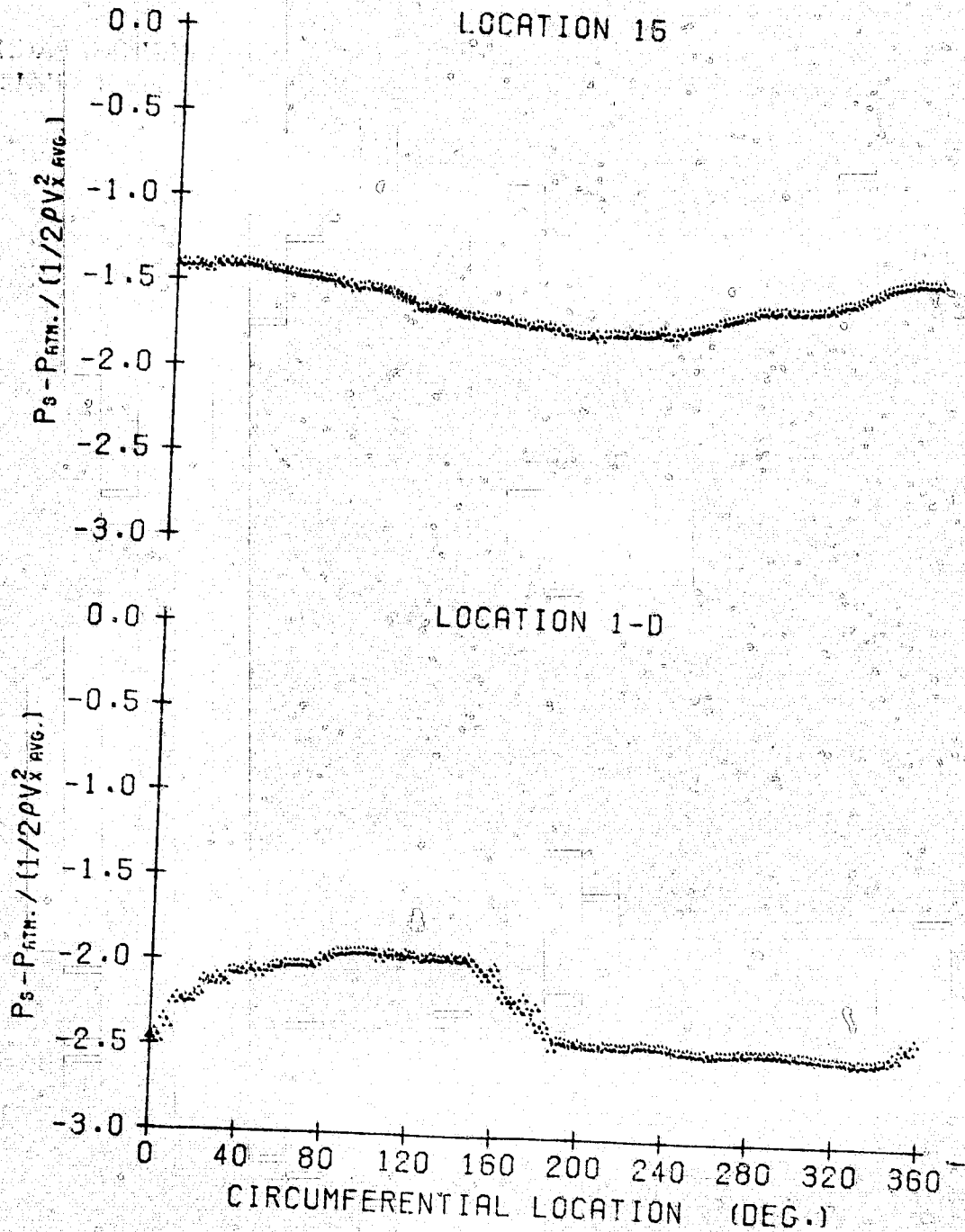


Figure G.41

-481-

10 October 1978
LCB:jep

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6 BLADES
55 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1646

AVG. FLOW COEF. = 0.533
AVG. P-RISE COEF. = 0.801
AVG. INCIDENCE = 6.47 DEG.

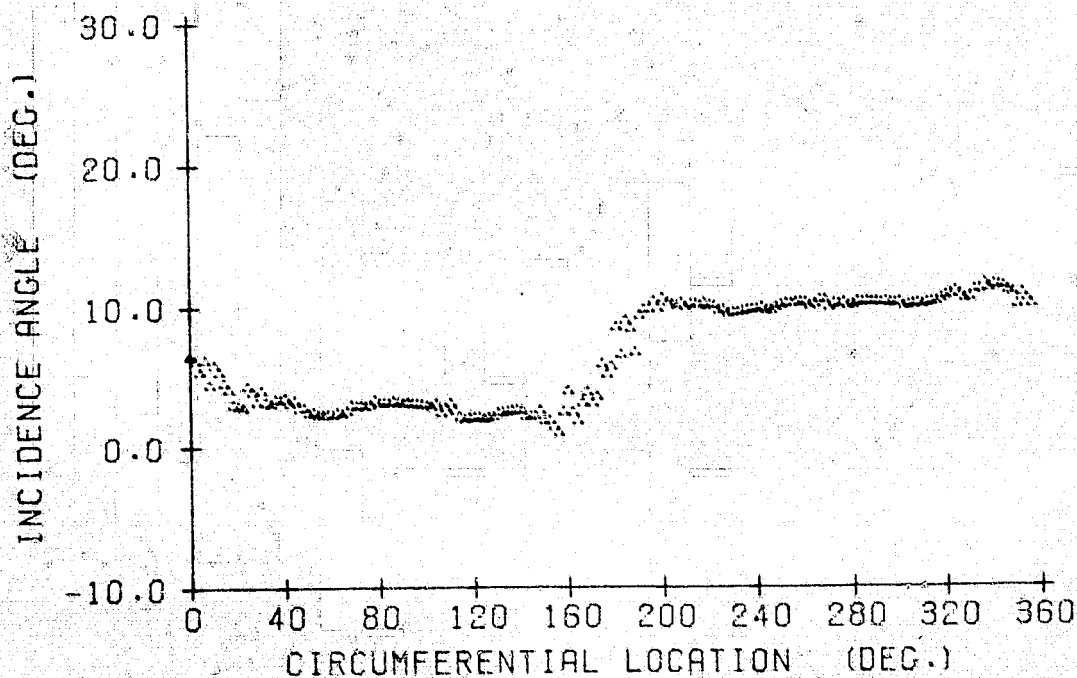


Figure G.42

C-6

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10 October 1978

LCB:jep

6 BLADES

55 DEG. STAGGER ANGLE

180 DEG. SQ. DISTORTION

RPM = 1941

AVG. FLOW COEF. = 0.474

AVG. P-RISE COEF. = 1.794

AVG. INCIDENCE = 9.35 DEG.

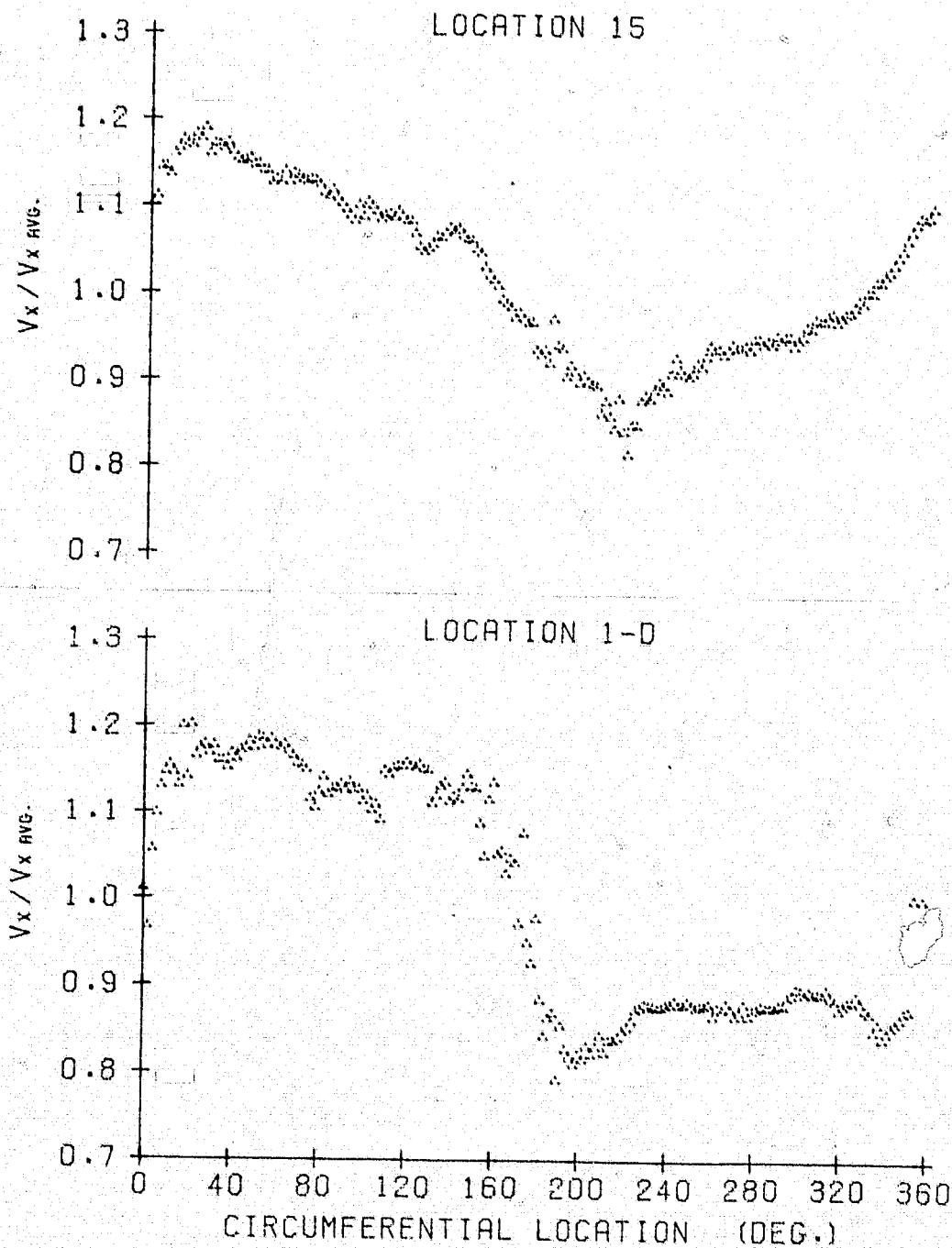


Figure G.43

10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1941

AVG. FLOW COEF. = 0.474
AVG. P-RISE COEF. = 1.794
AVG. INCIDENCE = 9.35 DEG.

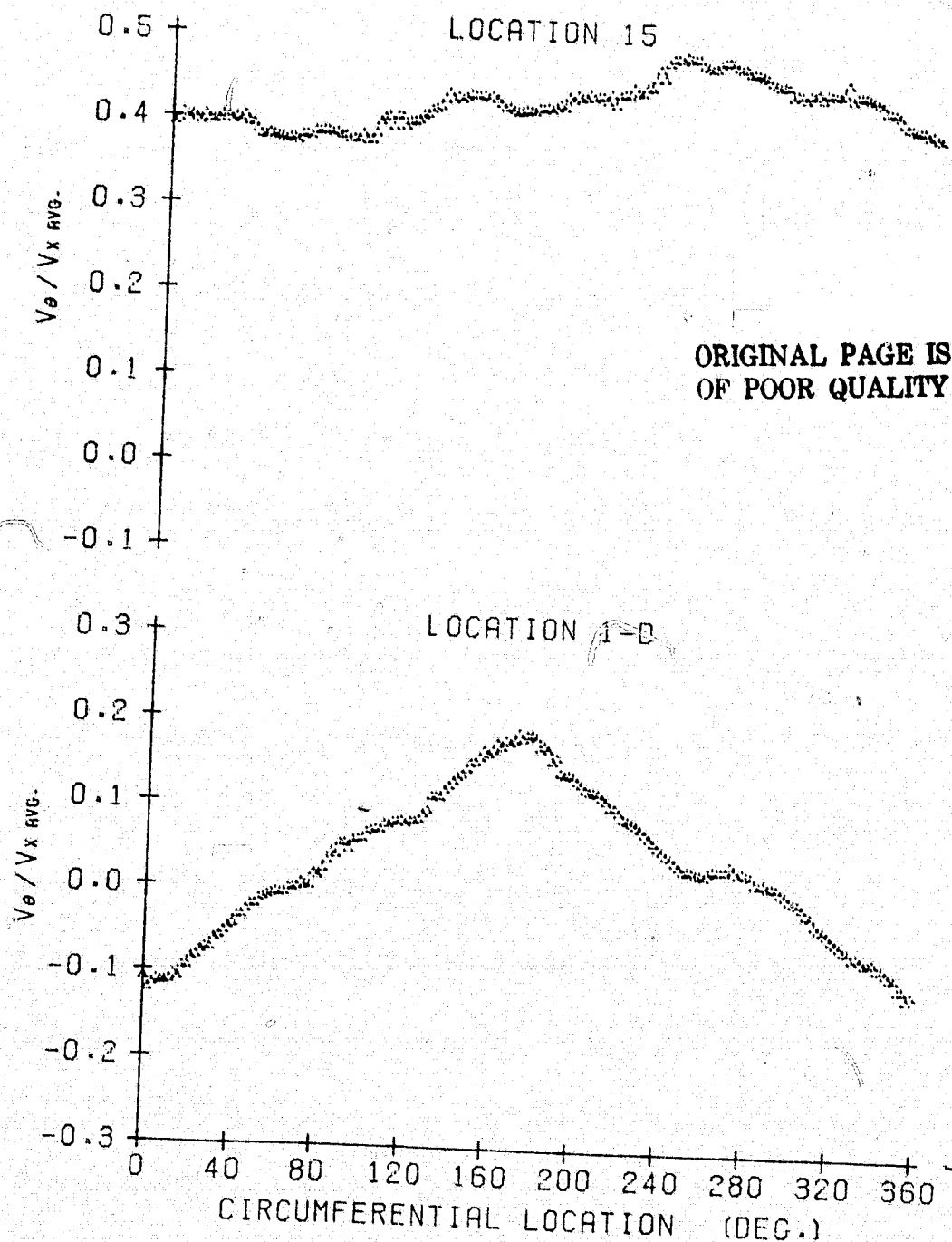


Figure G.44

10 October 1978
LGB:jep

6 BLADES
55 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1941
AVE. FLOW COEF. = 0.474
AVE. P-RISE COEF. = 1.794
AVE. INCIDENCE = 9.35 DEG.

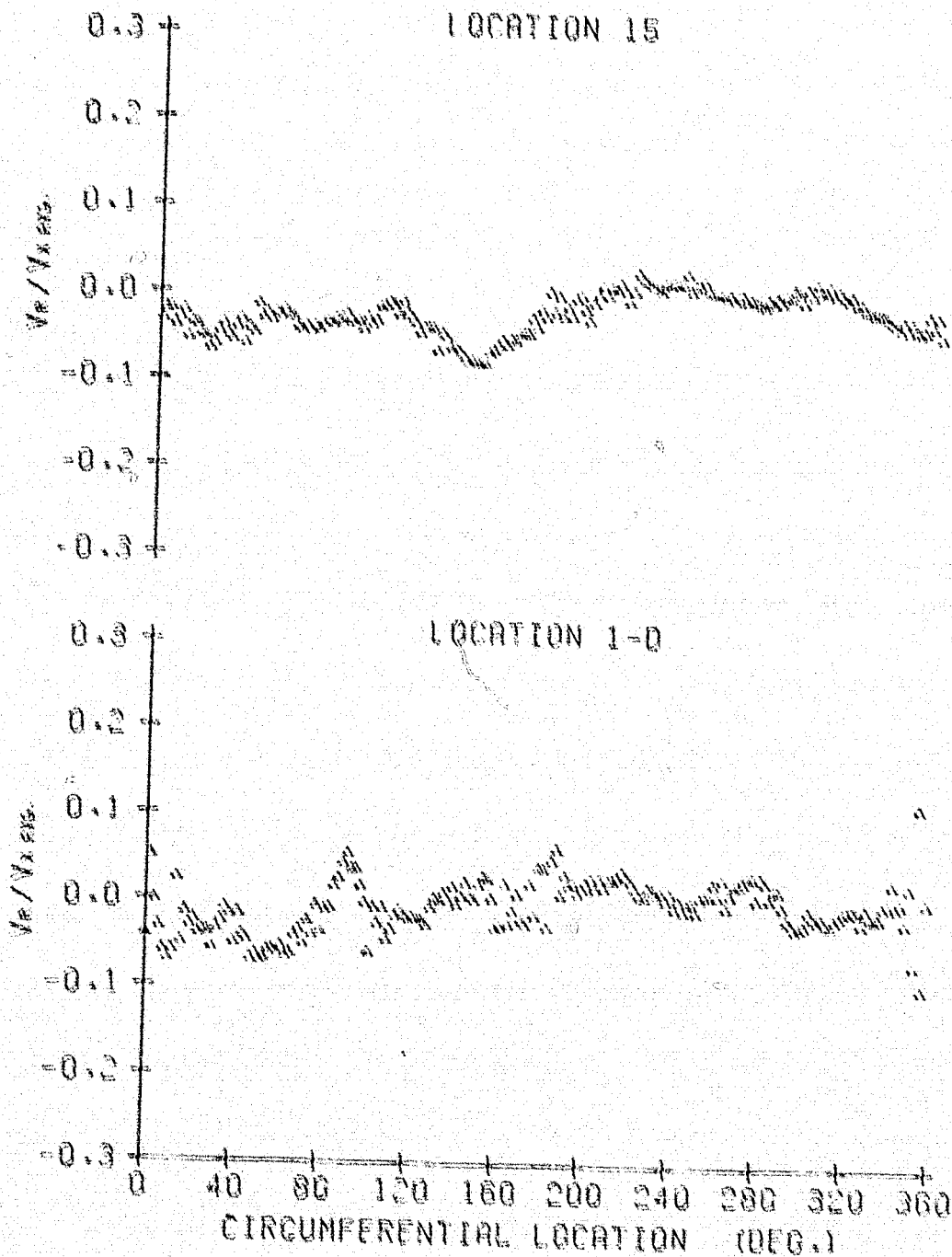
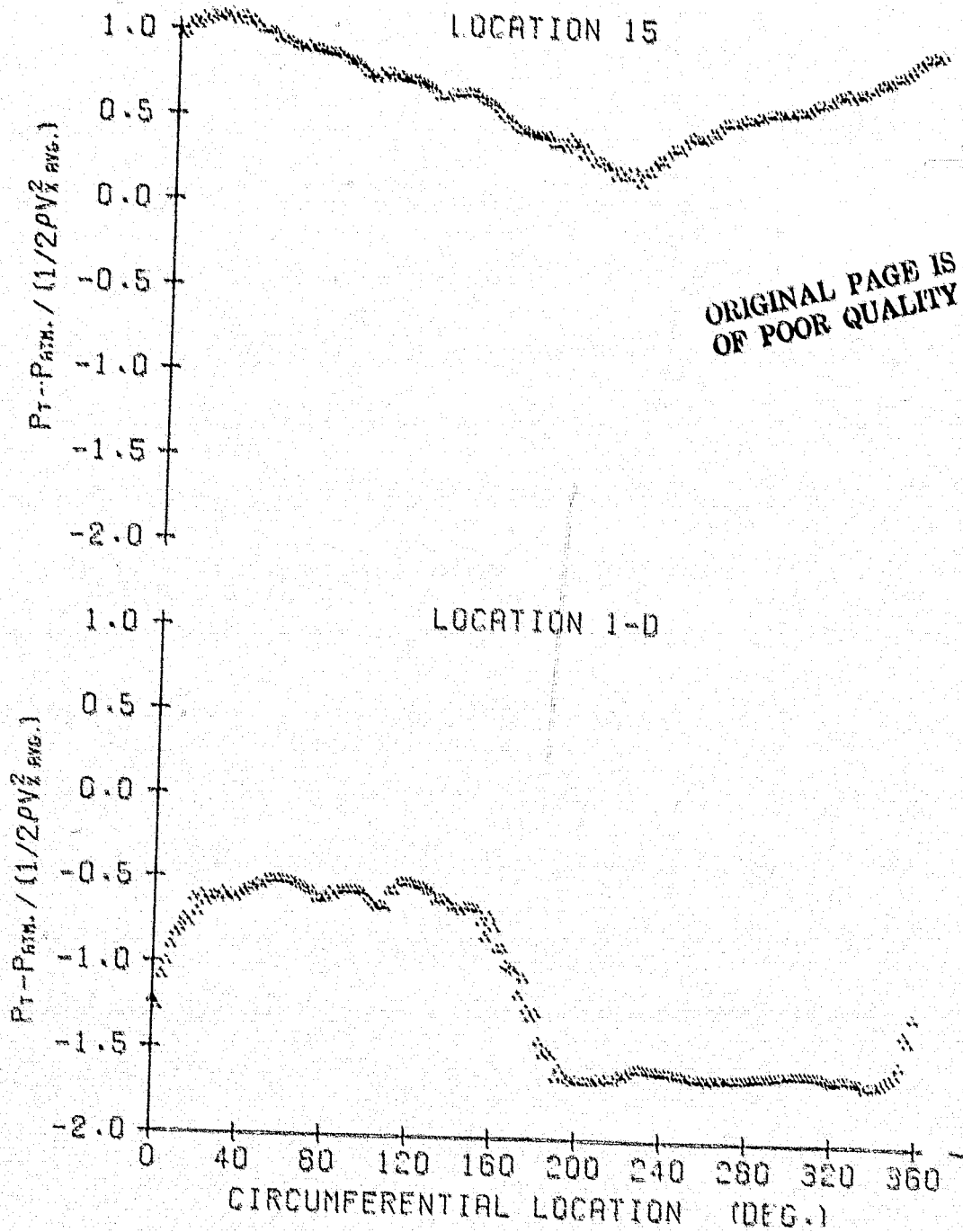


Figure 6.45

10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1941

AVG. FLOW COEFF. = 0.474
AVG. P-RISE COEFF. = 1.794
AVG. INCIDENCE = 9.35 DEG.



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Figure G.46

-486-

10 October 1978
LCB:jep

6 BLADES
55 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1941

AVG. FLOW COEFF. = 0.474
AVG. P-RISE COEFF. = 1.794
AVG. INCIDENCE = 9.35 DEG.

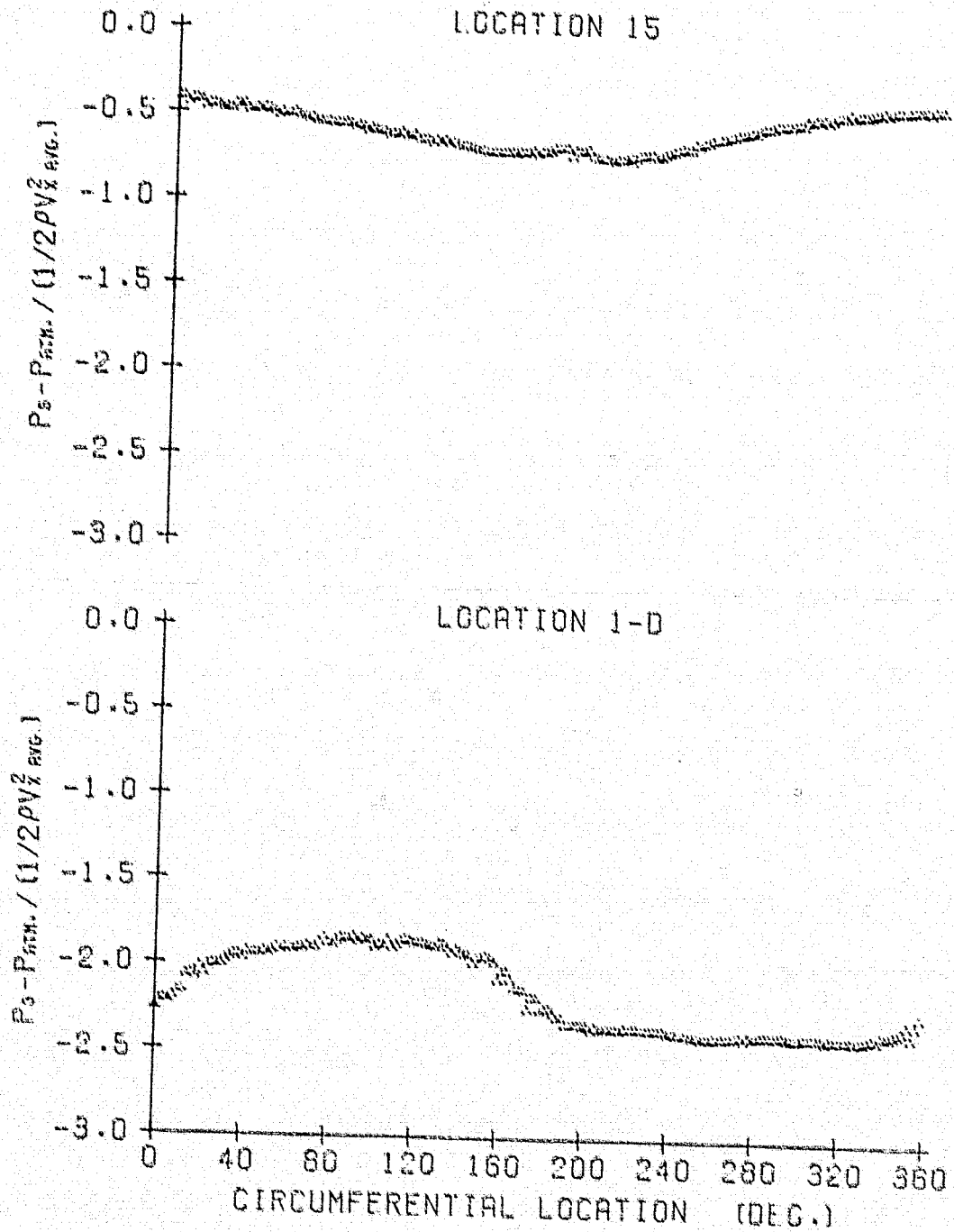


Figure G.47

10 October 1978
LCB:jep

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6 BLADES
55 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1941
AVG. FLOW COEF. = 0.474
AVG. P-RISE COEF. = 1.794
AVG. INCIDENCE = 9.35 DEG.

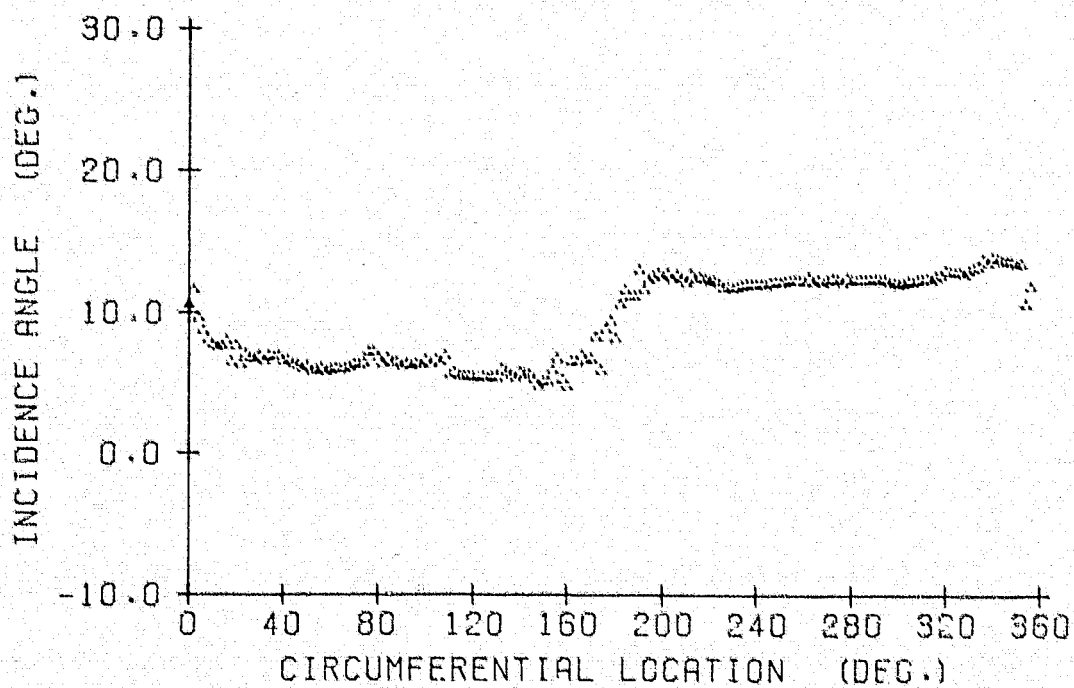


Figure G.48

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1515

AVG. FLOW COEF. = 0.605
AVG. P-RISE COEF. = 1.295
AVG. INCIDENCE = 2.56 DEG.

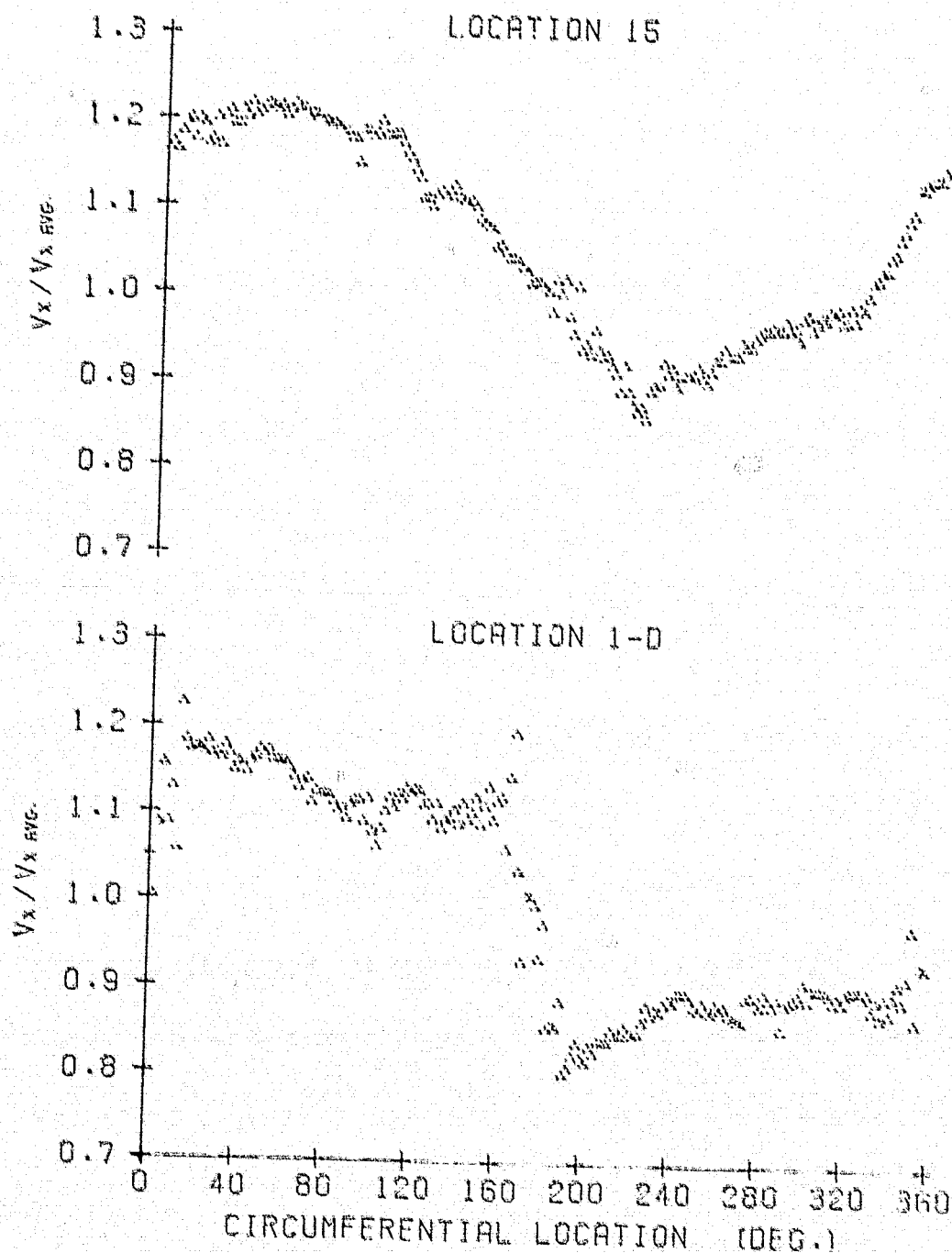


Figure G.49

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1515

AVG. FLOW COEF. = 0.605
AVG. P-RISE COEF. = 1.205
AVG. INCIDENCE = 2.56 DEG.

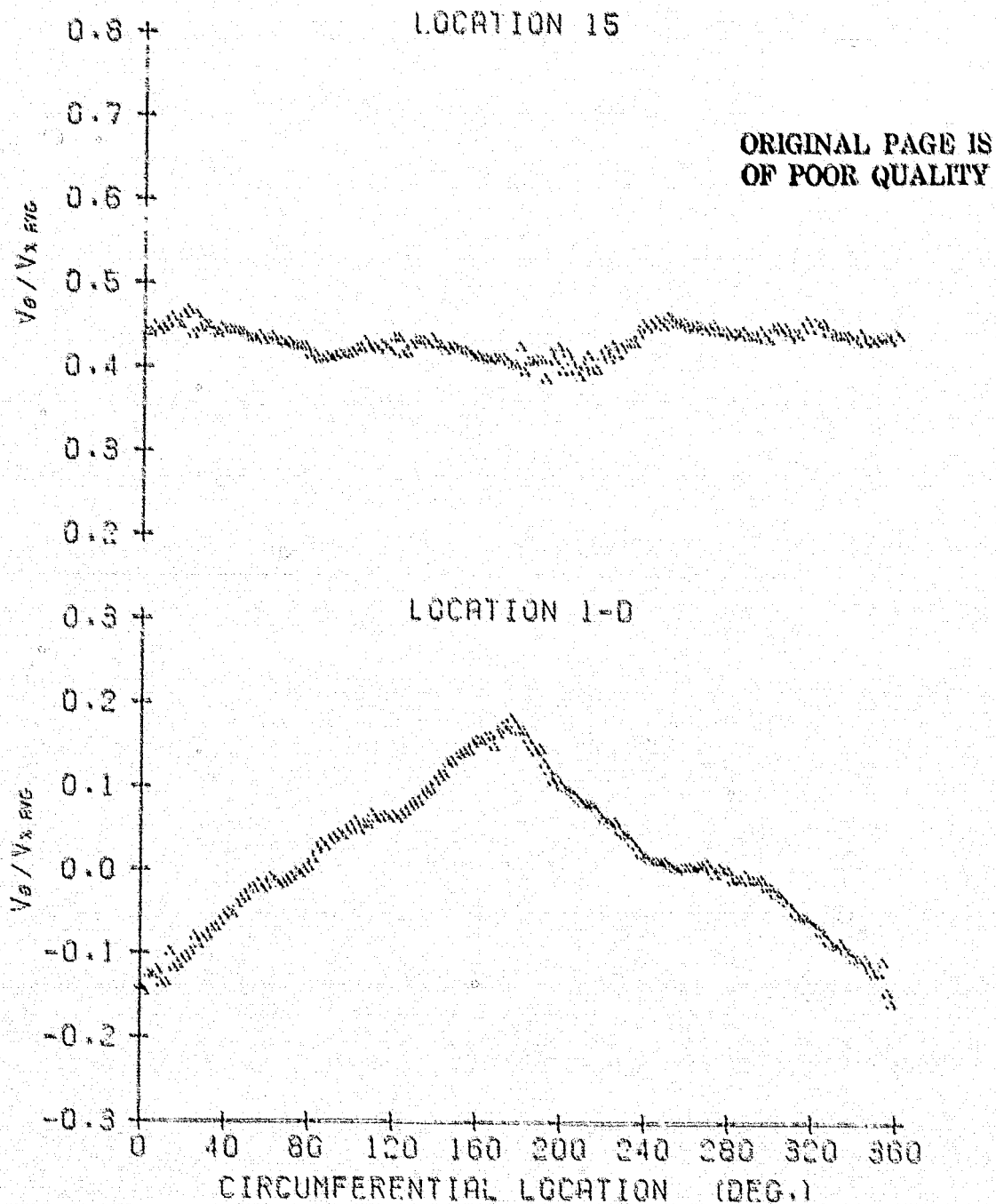


Figure G.50

10 October 1978
LGB:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1515

AVG. FLOW COEF. = 0.605
AVG. P-RISE COEF. = 1.295
AVG. INCIDENCE = 2.56 DEG.

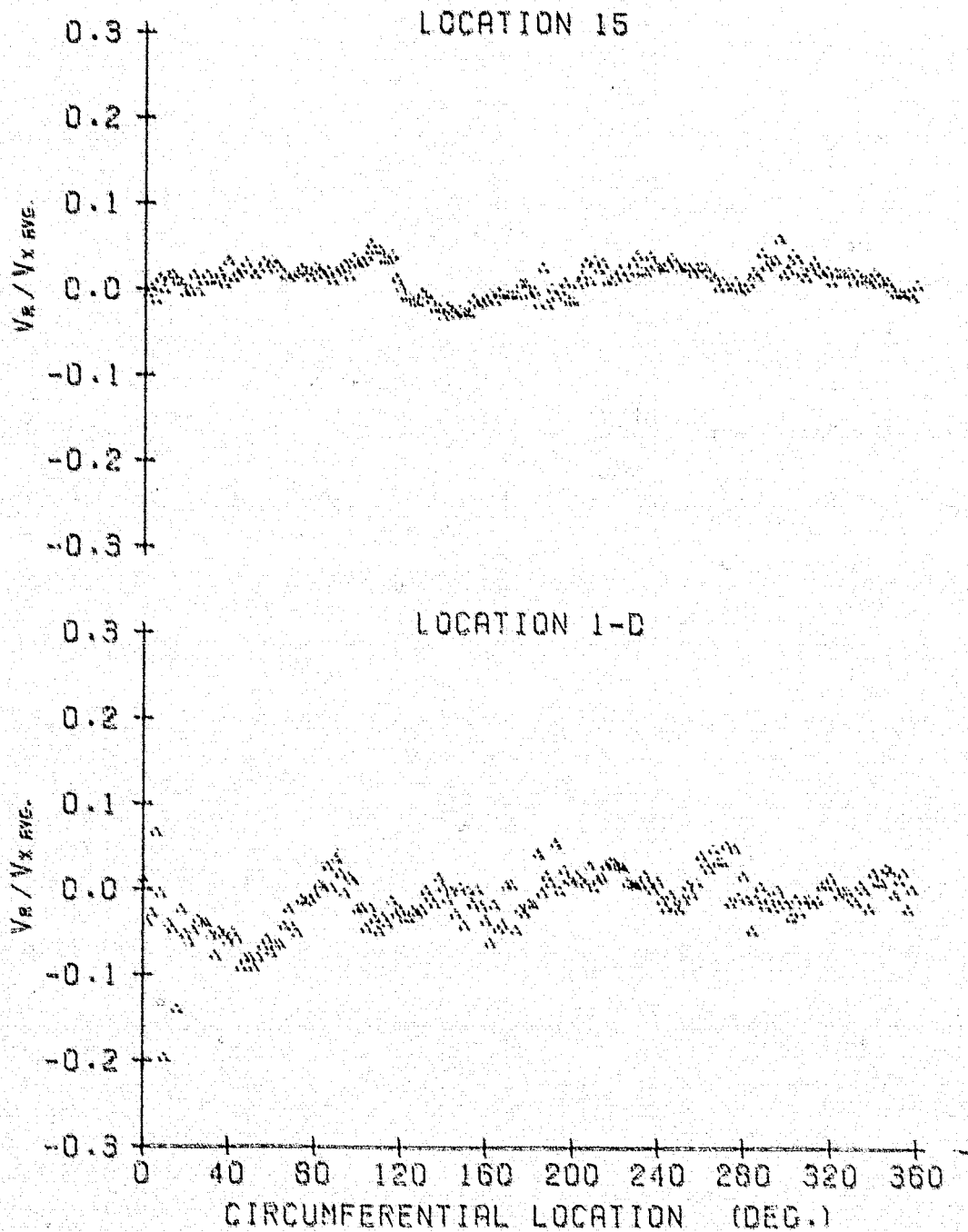


Figure G.51

10 October 1978

LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1515

AVG. FLOW COEF. = 0.605
AVG. P-RISE COEF. = 1.295
AVG. INCIDENCE = 2.56 DEG.

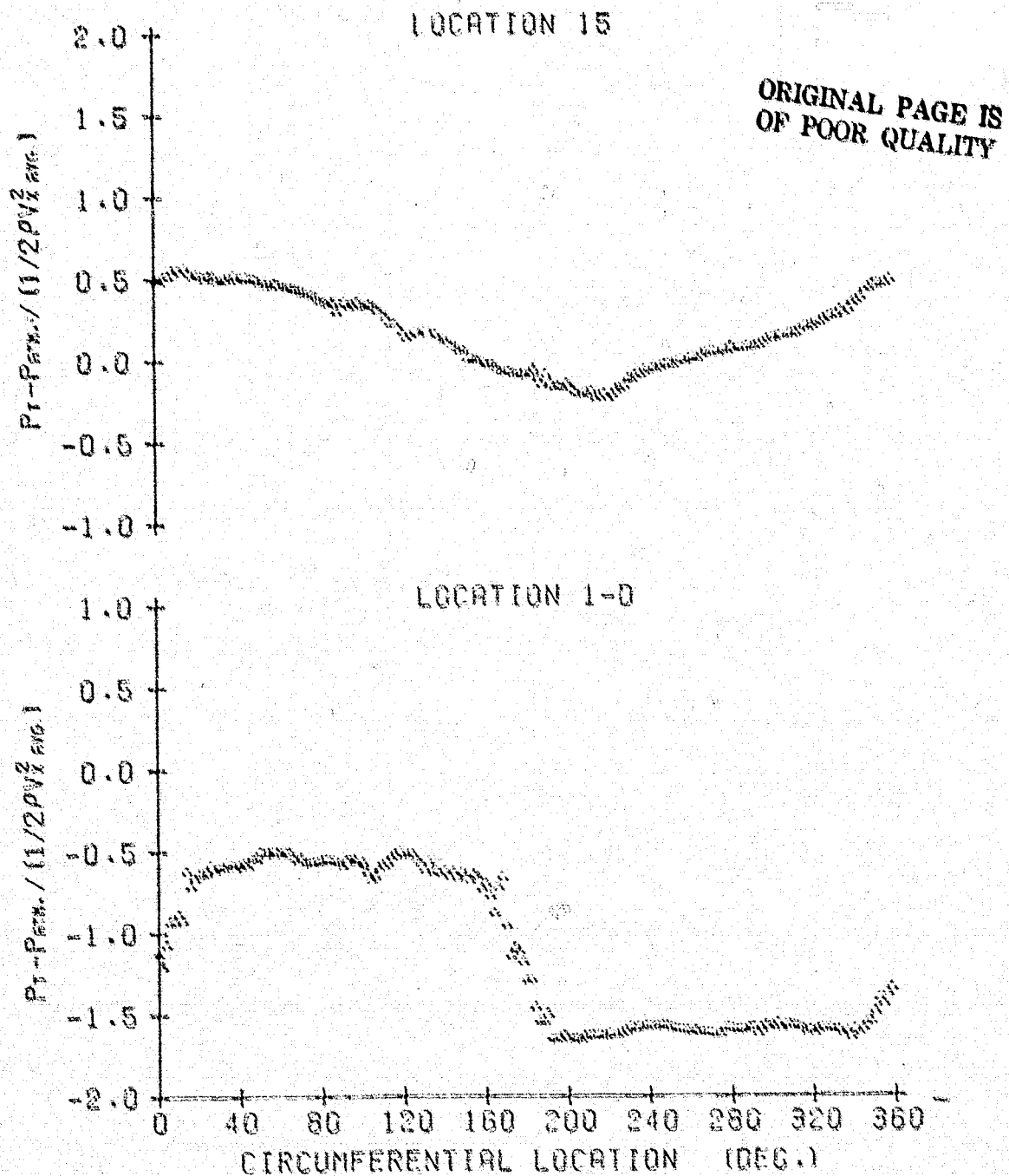


Figure G.52

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1515

AVG. FLOW COEF. = 0.605
AVG. P-RISE COEF. = 1.295
AVG. INCIDENCE = 2.56 DEG.

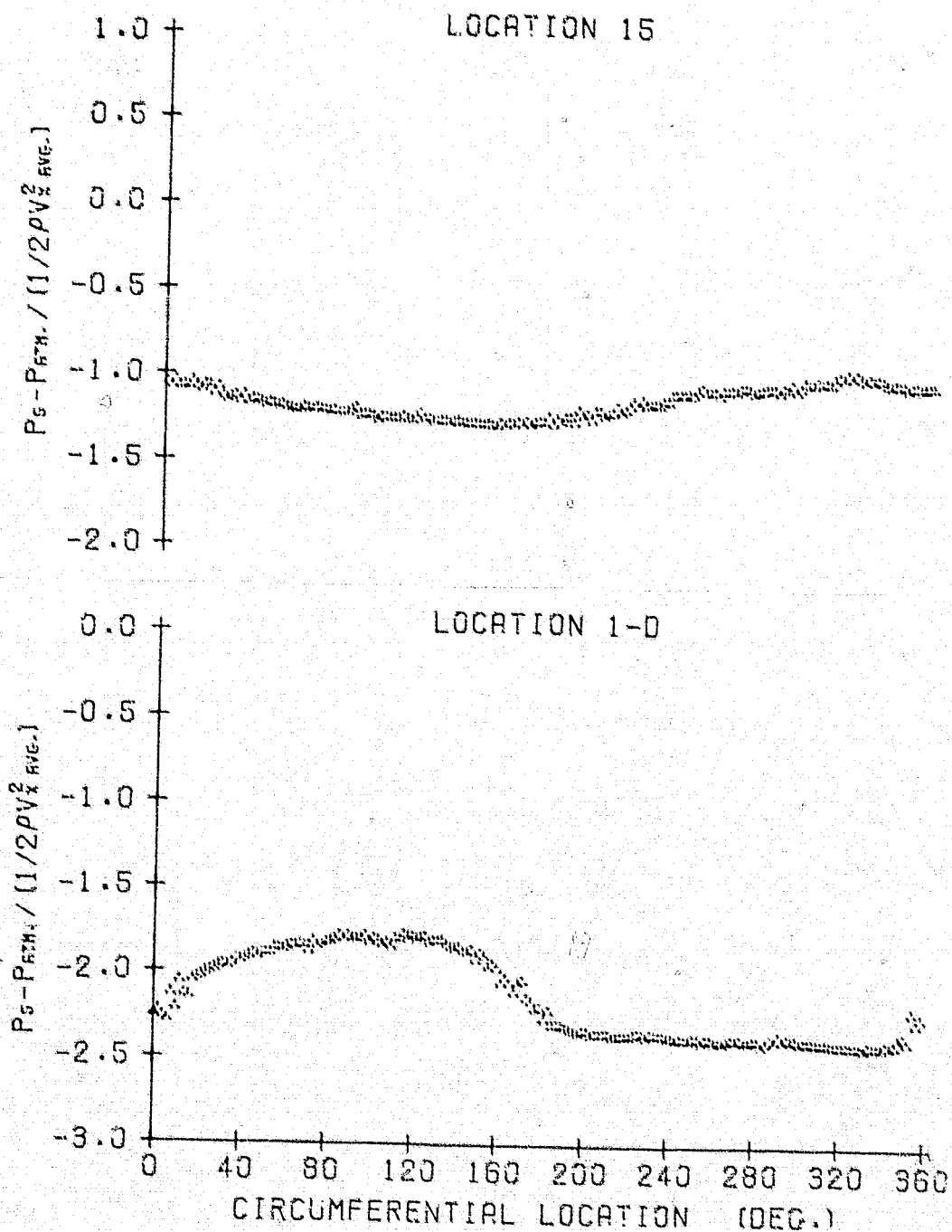


Figure G.53

10 October 1978

LCB:jep

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9 BLADES

50 DEG. STAGGER ANGLE

180 DEG. SQ. DISTORTION

RPM = 1515

AVG. FLOW COEF. = 0.605

AVG. P-RISE COEF. = 1.295

AVG. INCIDENCE = 2.56 DEG.

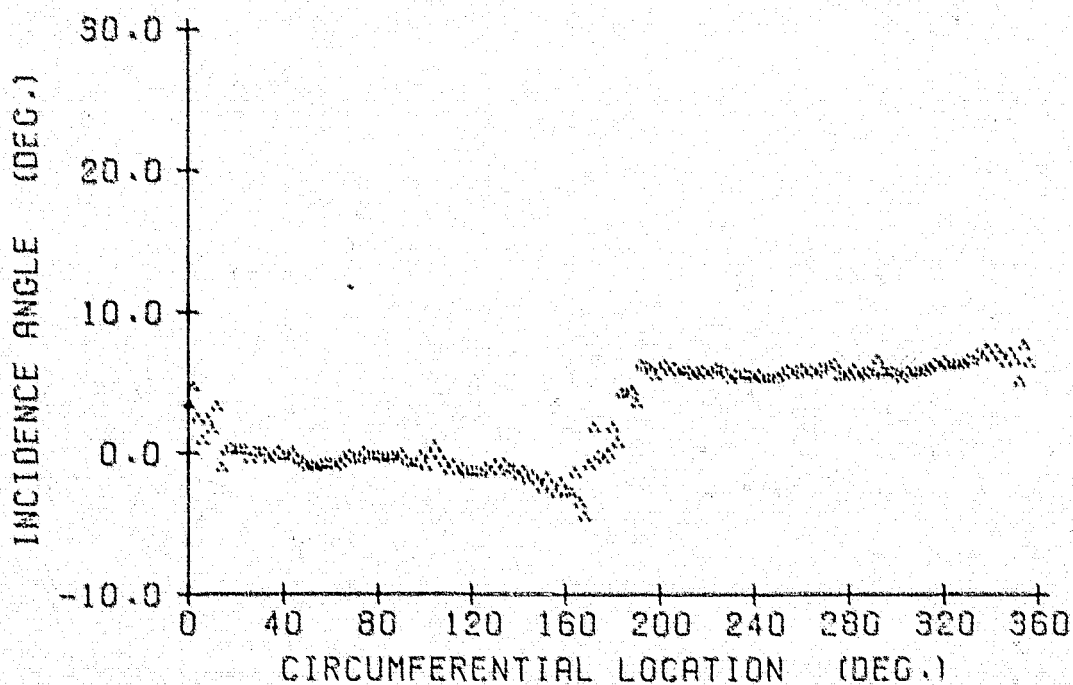


Figure 6.54

10 October 1978
LCB:jep

9 BLADES

50 DEG. STAGGER ANGLE

180 DEG. SQ. DISTORTION

RPM = 1688

AVG. FLOW COEF. = 0.553

AVG. P-RISE COEF. = 2.011

AVG. INCIDENCE = 4.79 DEG.

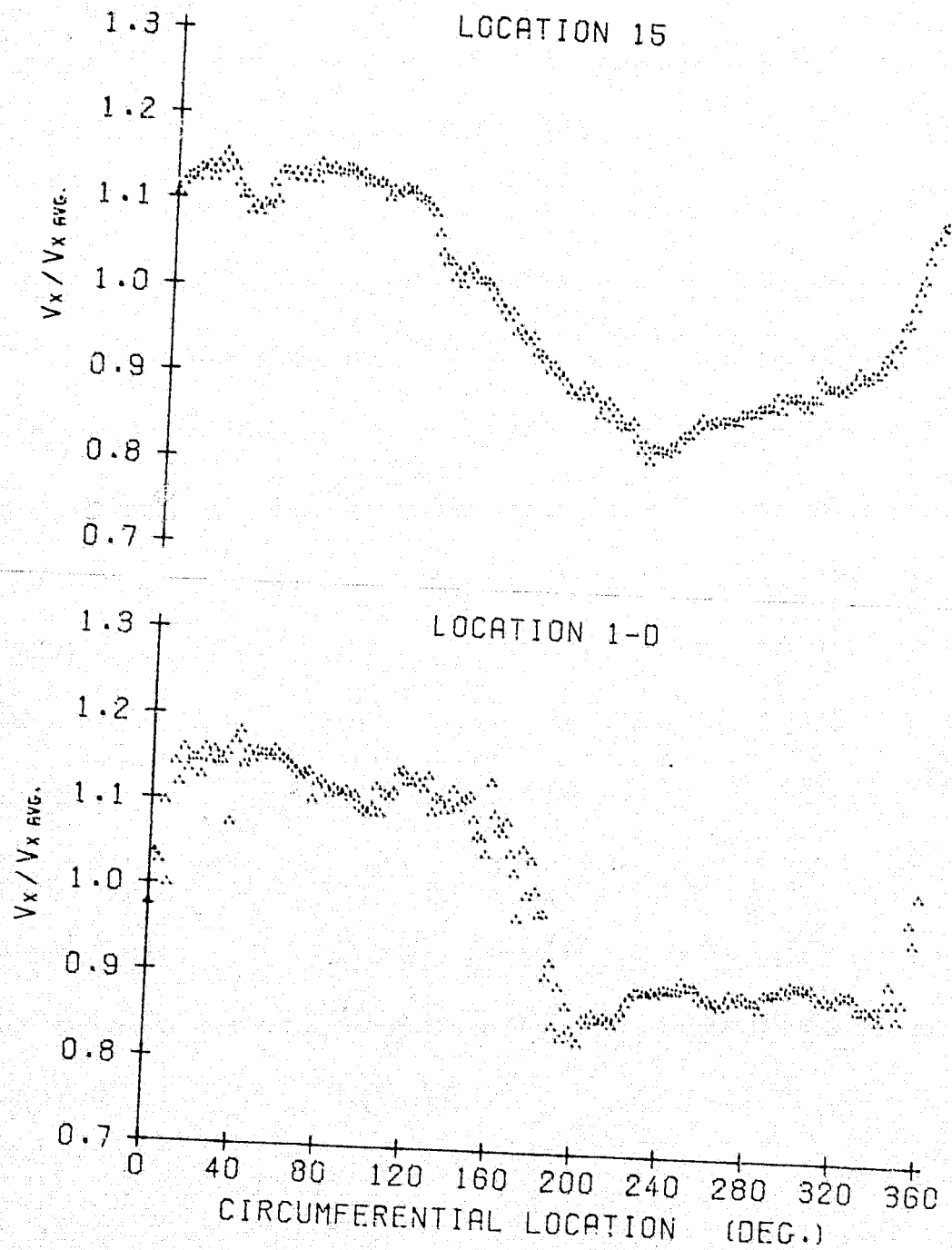


Figure G.55

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1688

AVG. FLOW COEF. = 0.553
AVG. P-RISE COEF. = 2.011
AVG. INCIDENCE = 4.79 DEG.

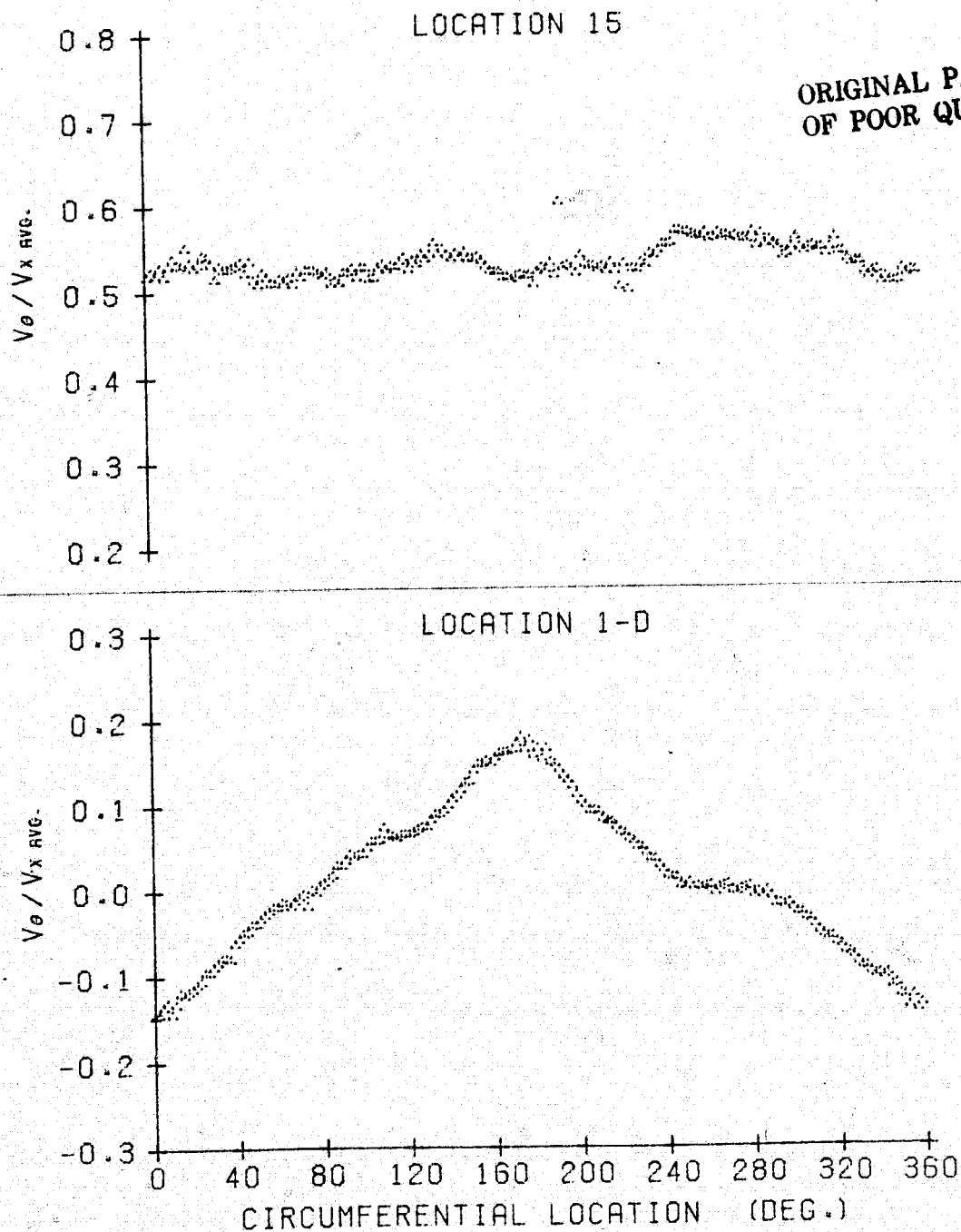


Figure G.56

10 October 1978
LCR:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1686

AVG. FLOW COEF. = 0.553
AVG. P-RISE COEF. = 2.011
AVG. INCIDENCE = 4.79 DEG.

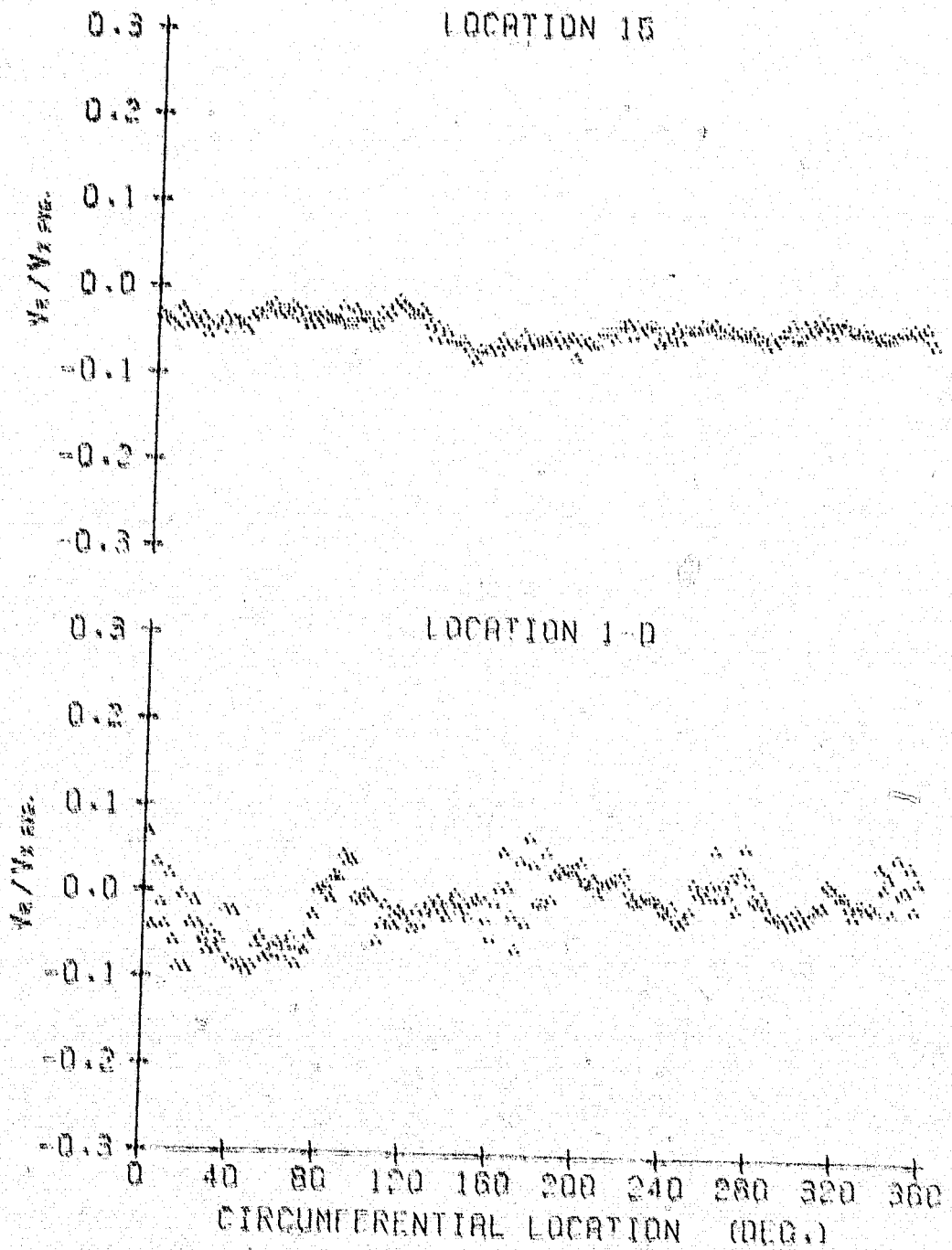


Figure G.57

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1688

AVG. FLOW COEFF. = 0.553
AVG. P-RISE COEFF. = 2.011
AVG. INCIDENCE = 4.79 DEG.

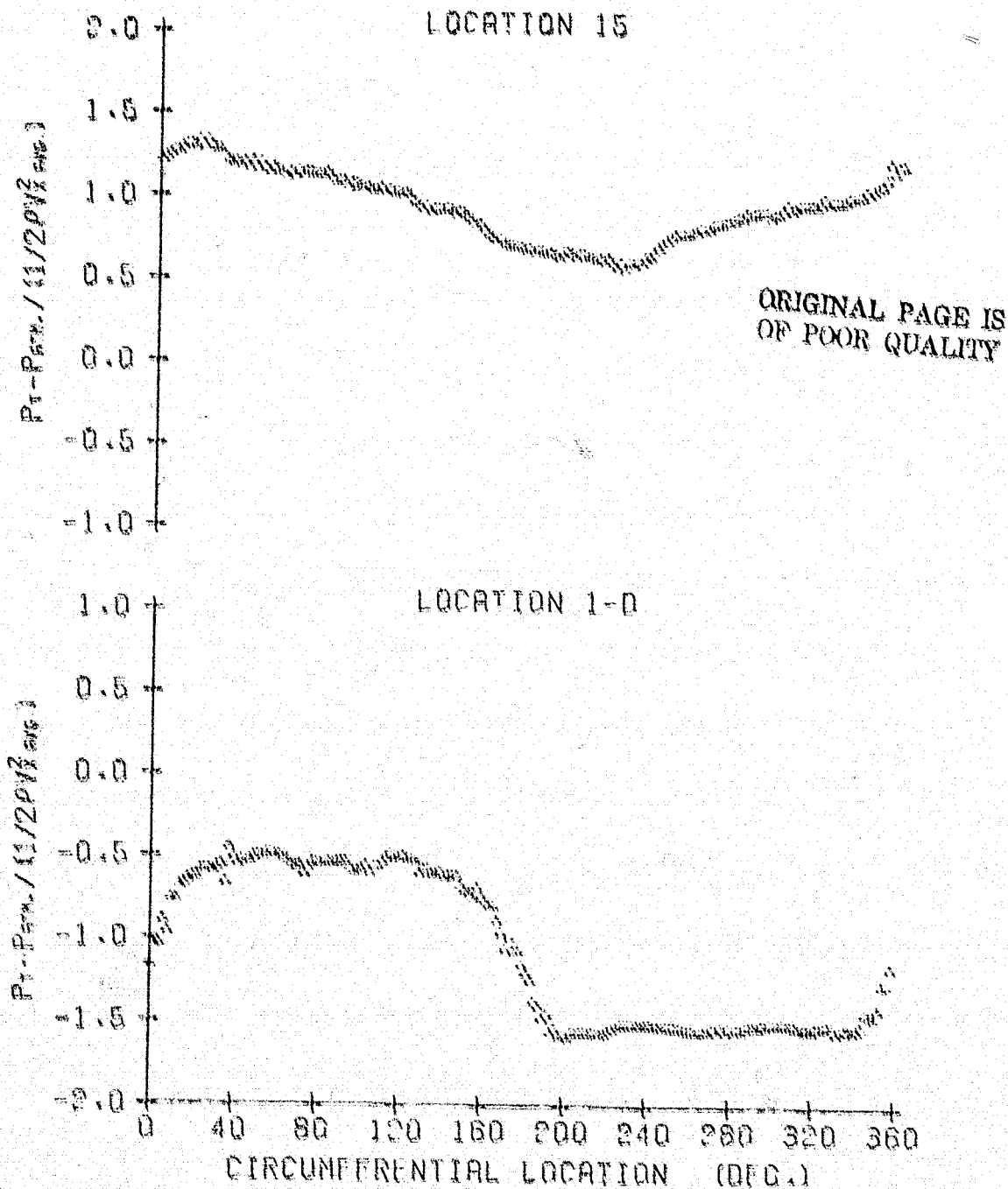


Figure G.58

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1688

AVG. FLOW COEFF. = 0.553
AVG. P-RISE COEF. = 2.011
AVG. INCIDENCE = 4.79 DEG.

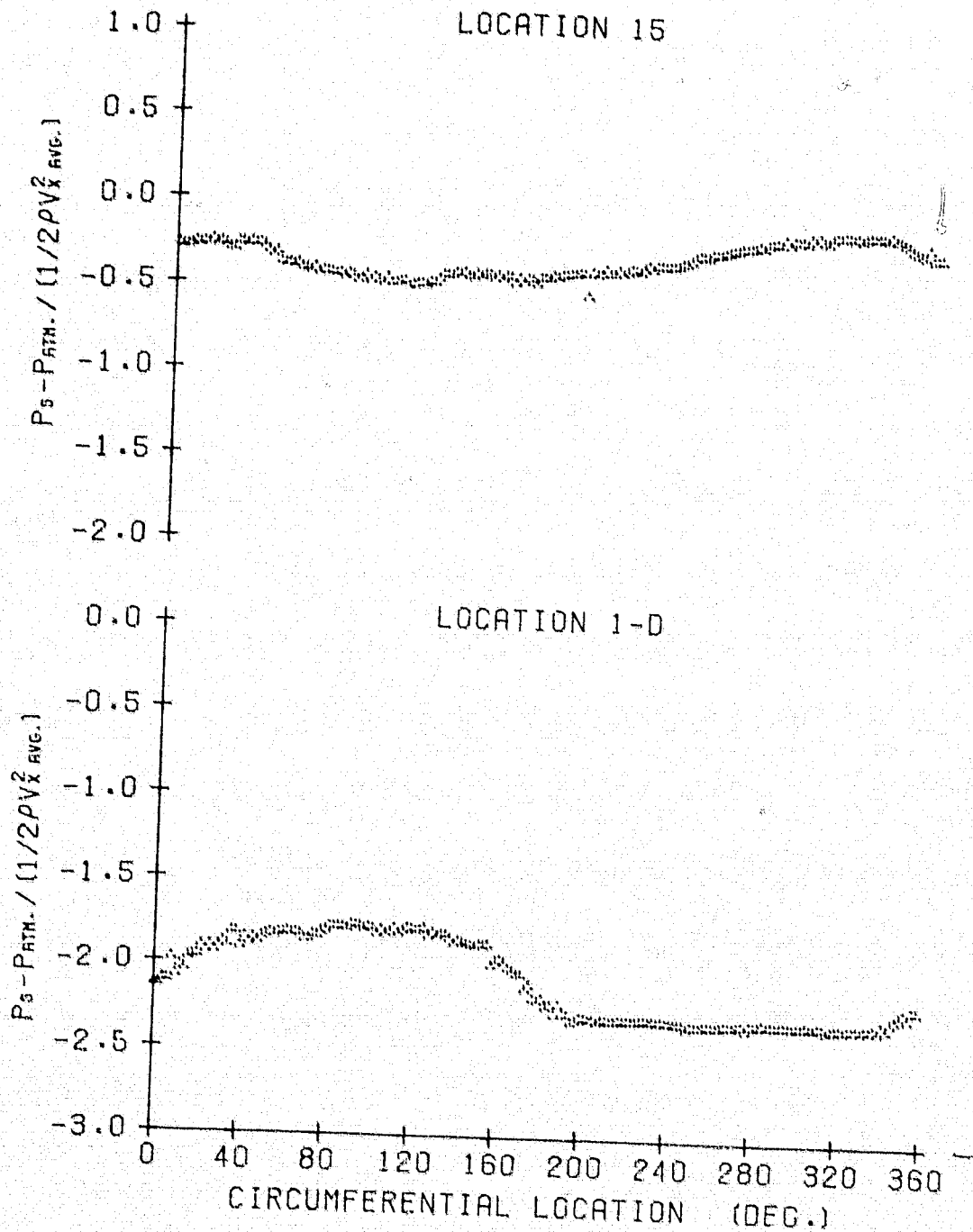


Figure G.59

10 October 1978
LGB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1688

AVG. FLOW COEFF. = 0.553
AVG. P-RISE COEFF. = 2.011
AVG. INCIDENCE = 4.79 DEG.

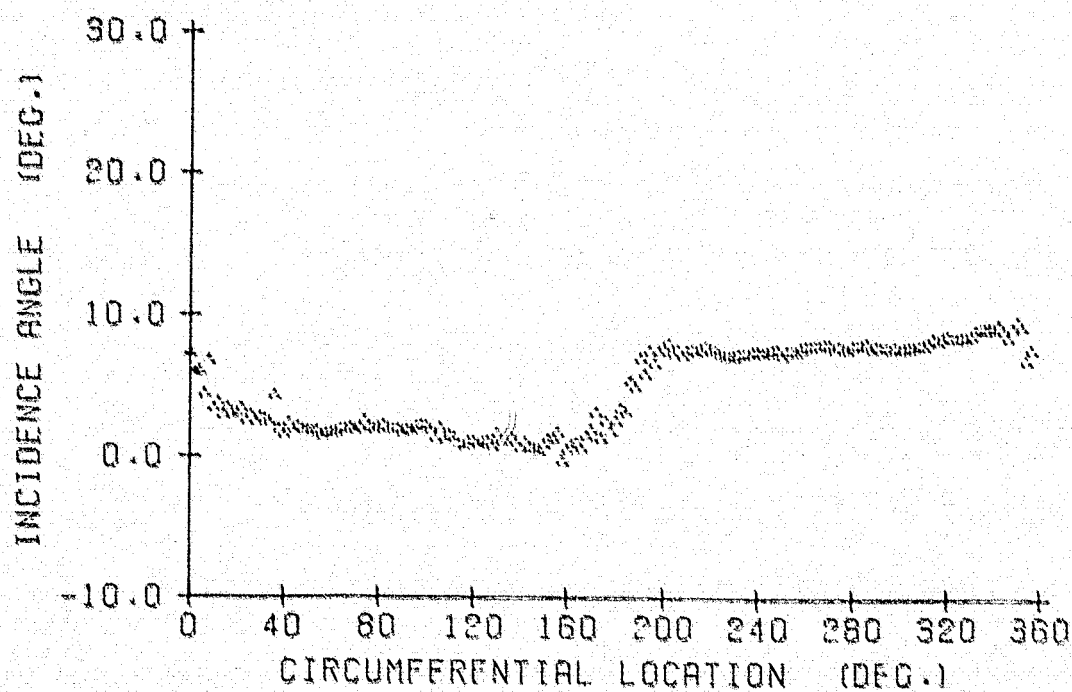


Figure G.60

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1825

AVG. FLOW COEF. = 0.507
AVG. P-RISE COEF. = 2.679
AVG. INCIDENCE = 6.85 DEG.

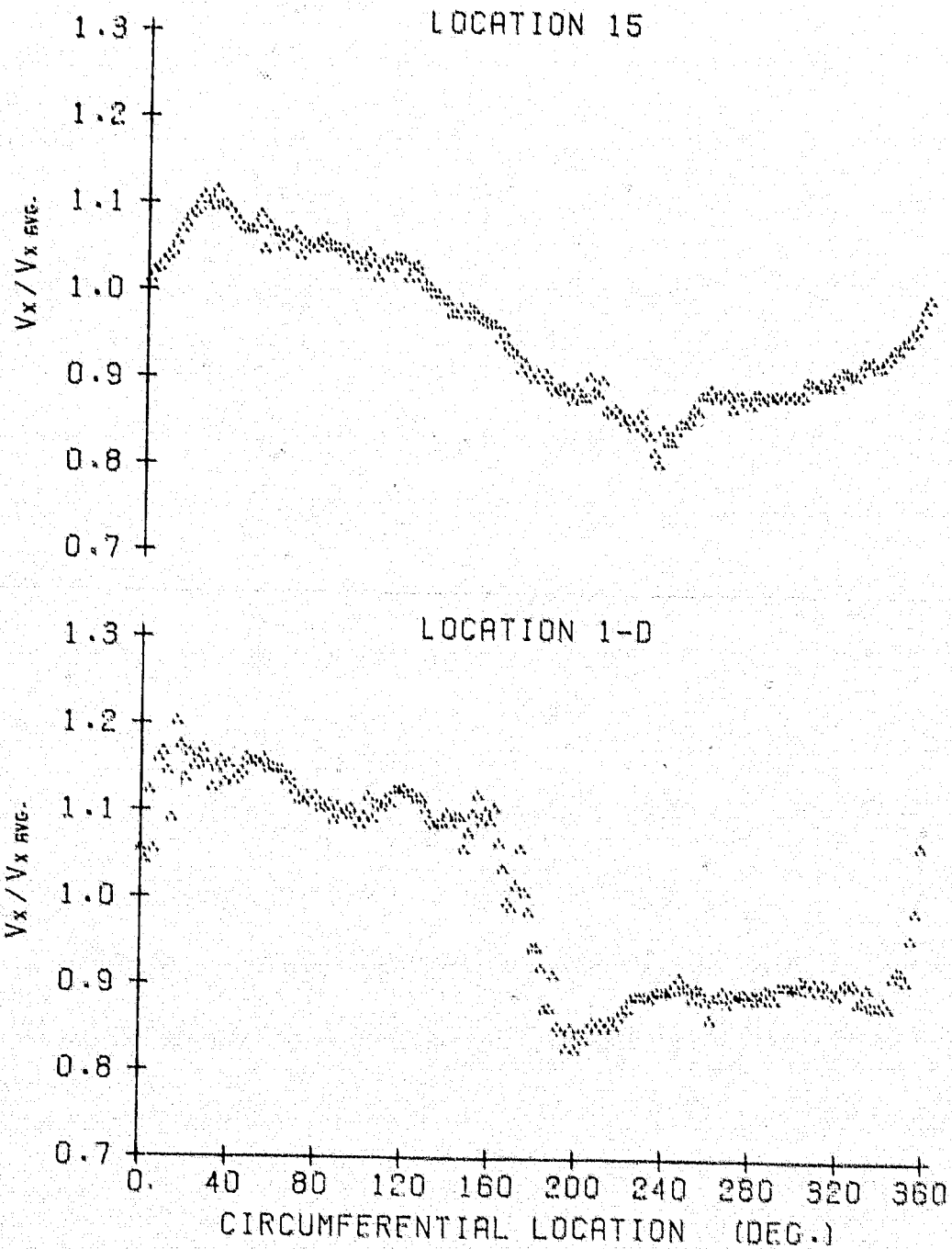


Figure G.61

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1825

AVG. FLOW COEF. = 0.507
AVG. P-RISE COEF. = 2.679
AVG. INCIDENCE = 6.85 DEG.

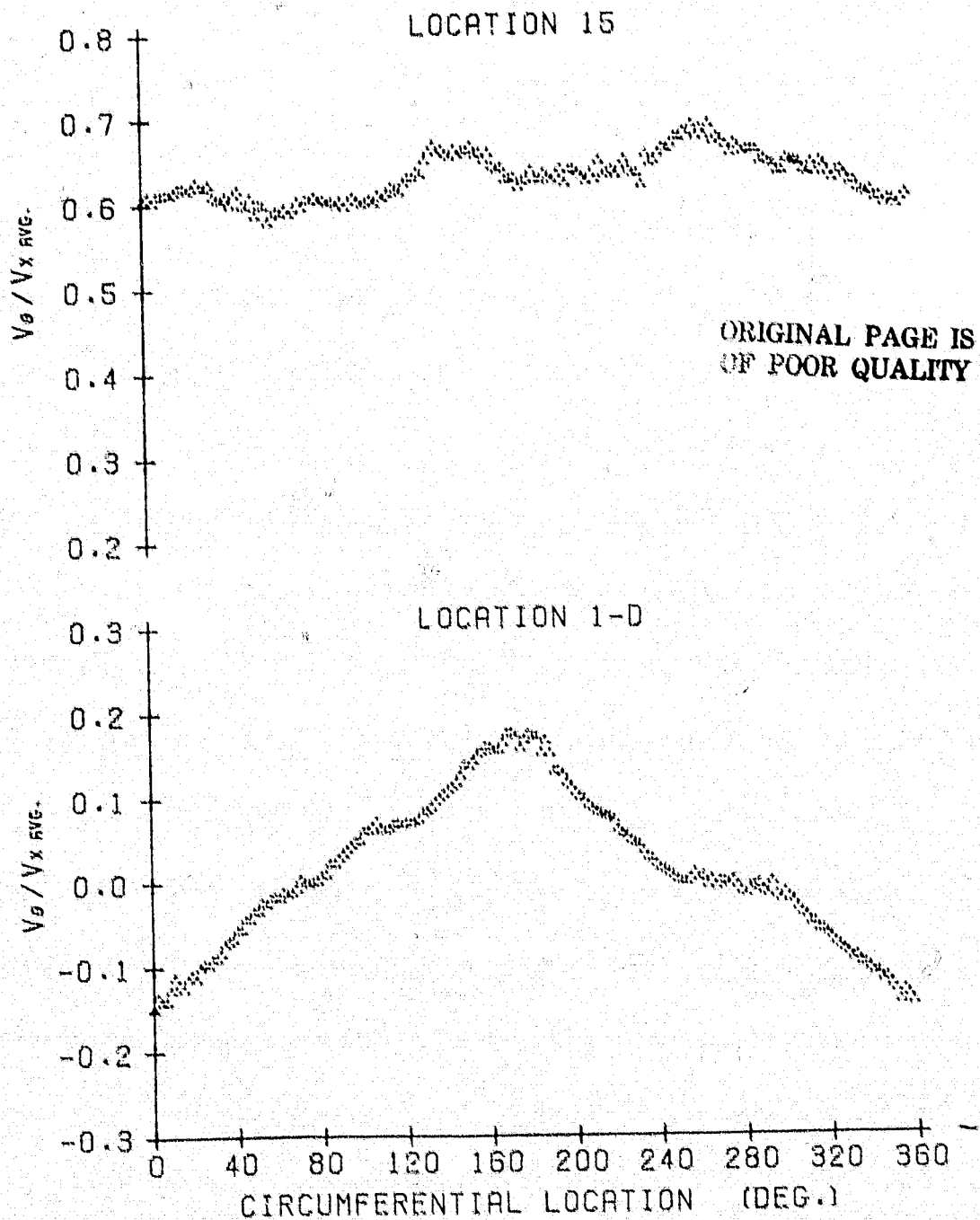


Figure G.62

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1825

AVG. FLOW COEFF. = 0.507

AVG. P-RISE COEF. = 2.679

AVG. INCIDENCE = 6.85 DEG.

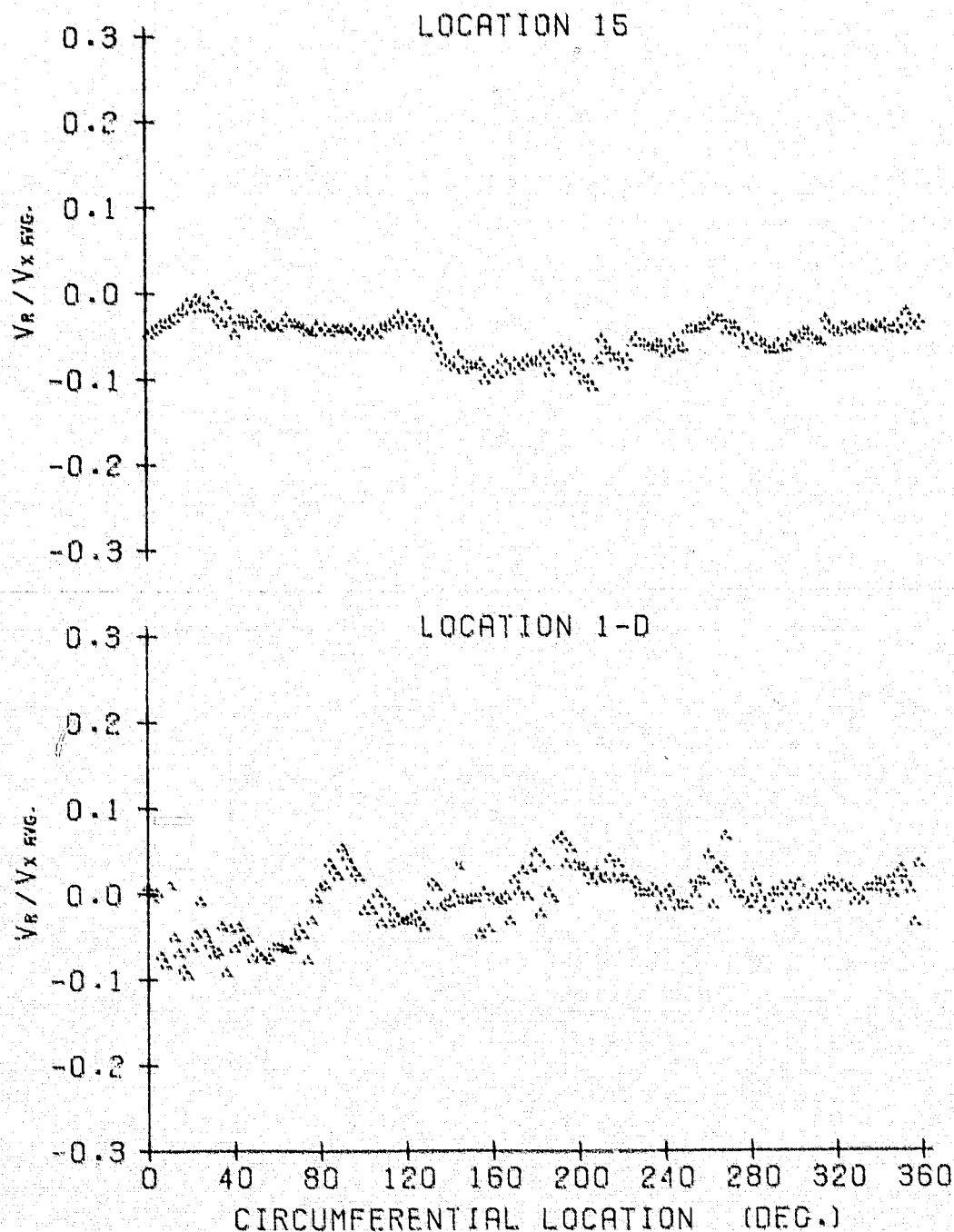


Figure G.63

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1825

AVG. FLOW COEF. = 0.507
AVG. P-RISE COEF. = 2.679
AVG. INCIDENCE = 6.85 DEG.

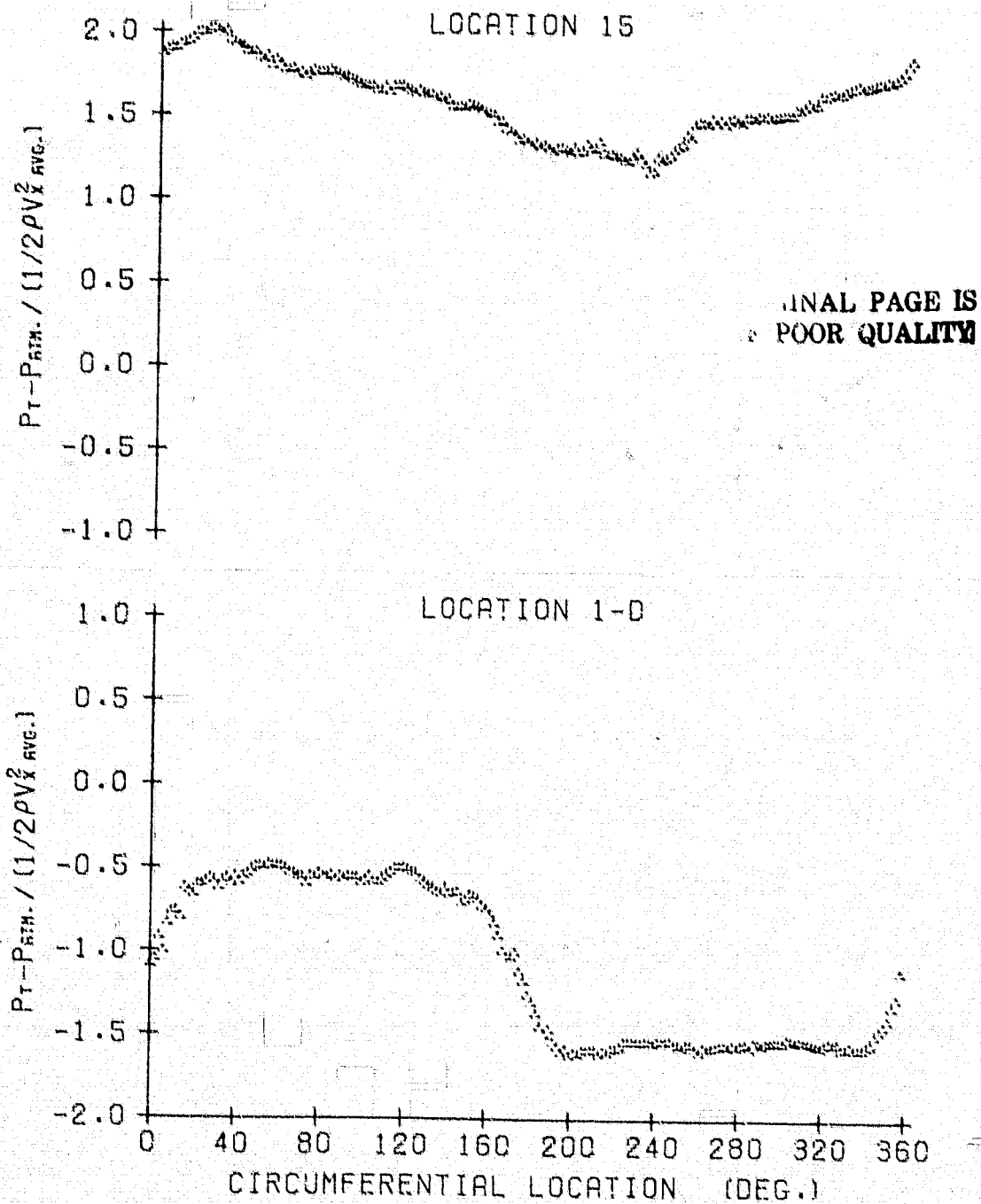


Figure G.64

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1825

AVG. FLOW COEF. = 0.507
AVG. P-RISE COEF. = 2.679
AVG. INCIDENCE = 6.85 DEG.

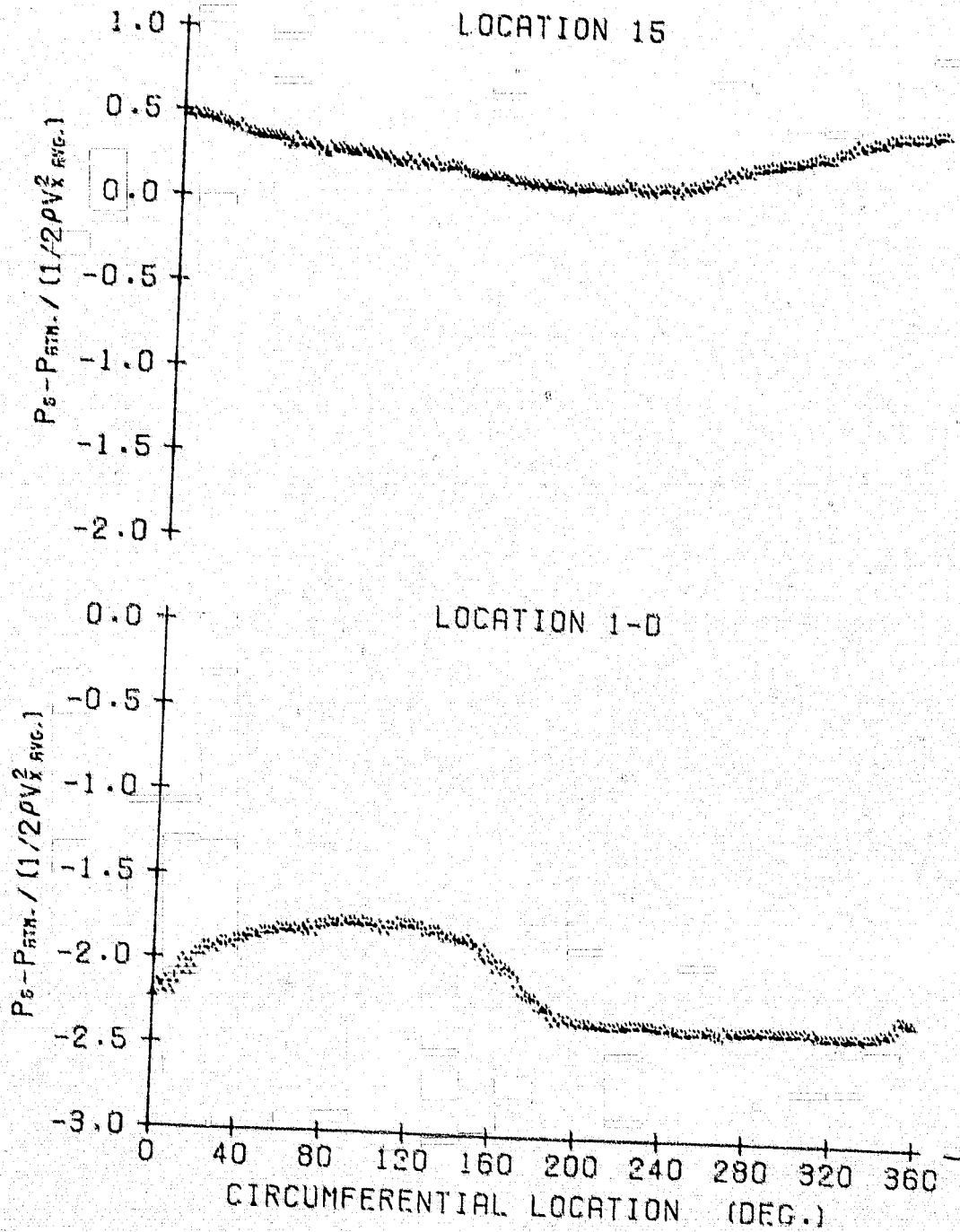


Figure G.65

10 October 1978
LCB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1825
AVG. FLOW COEF. = 0.507
AVG. P-RISE COEF. = 2.679
AVG. INCIDENCE = 6.85 DEG.

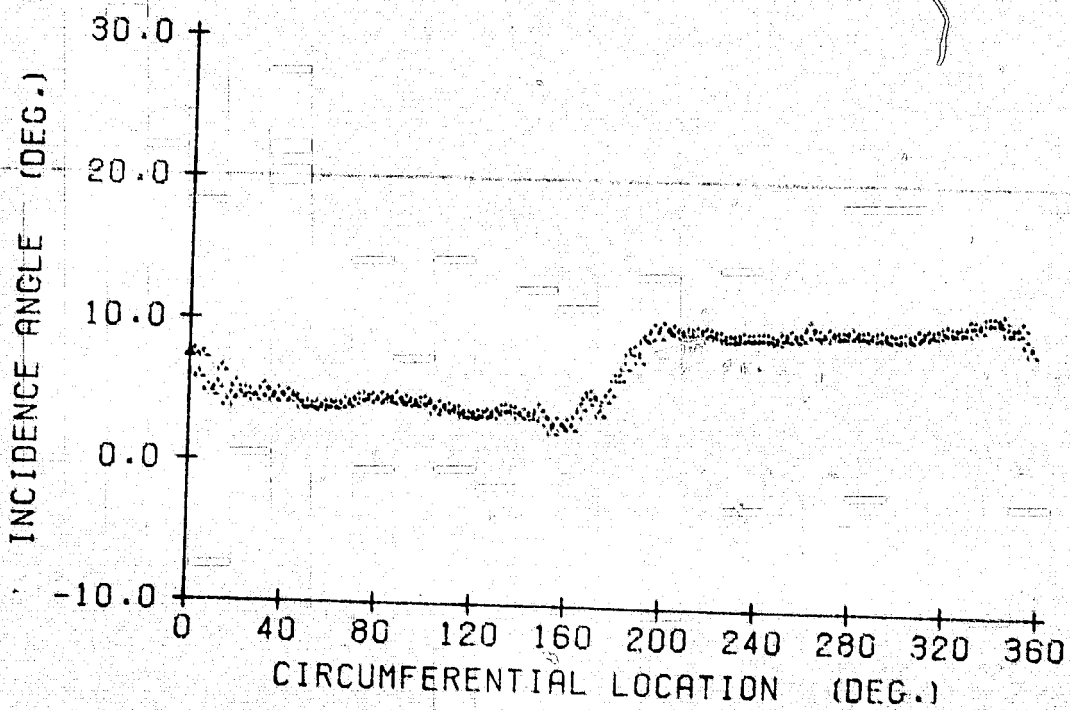


Figure G.66

-506-

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1515

AVG. FLOW COEF. = 0.606
AVG. P-RISE COEF. = 1.268
AVG. INCIDENCE = 2.69 DEGS.

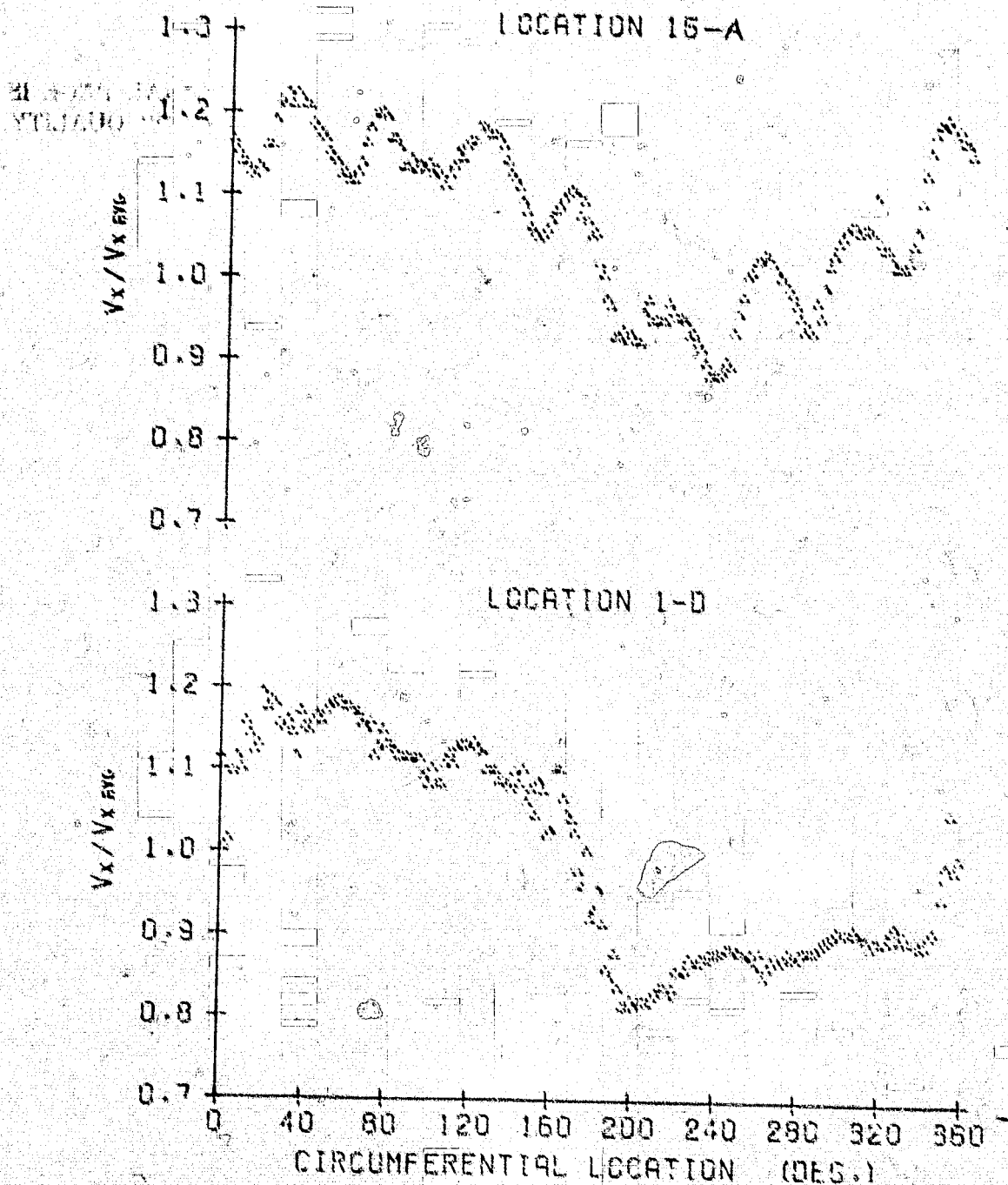


Figure G.67

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1515

AVG. FLOW COEF. = 0.606
AVG. P-RISE COEF. = 1.258
AVG. INCIDENCE = 2.69 DEG.

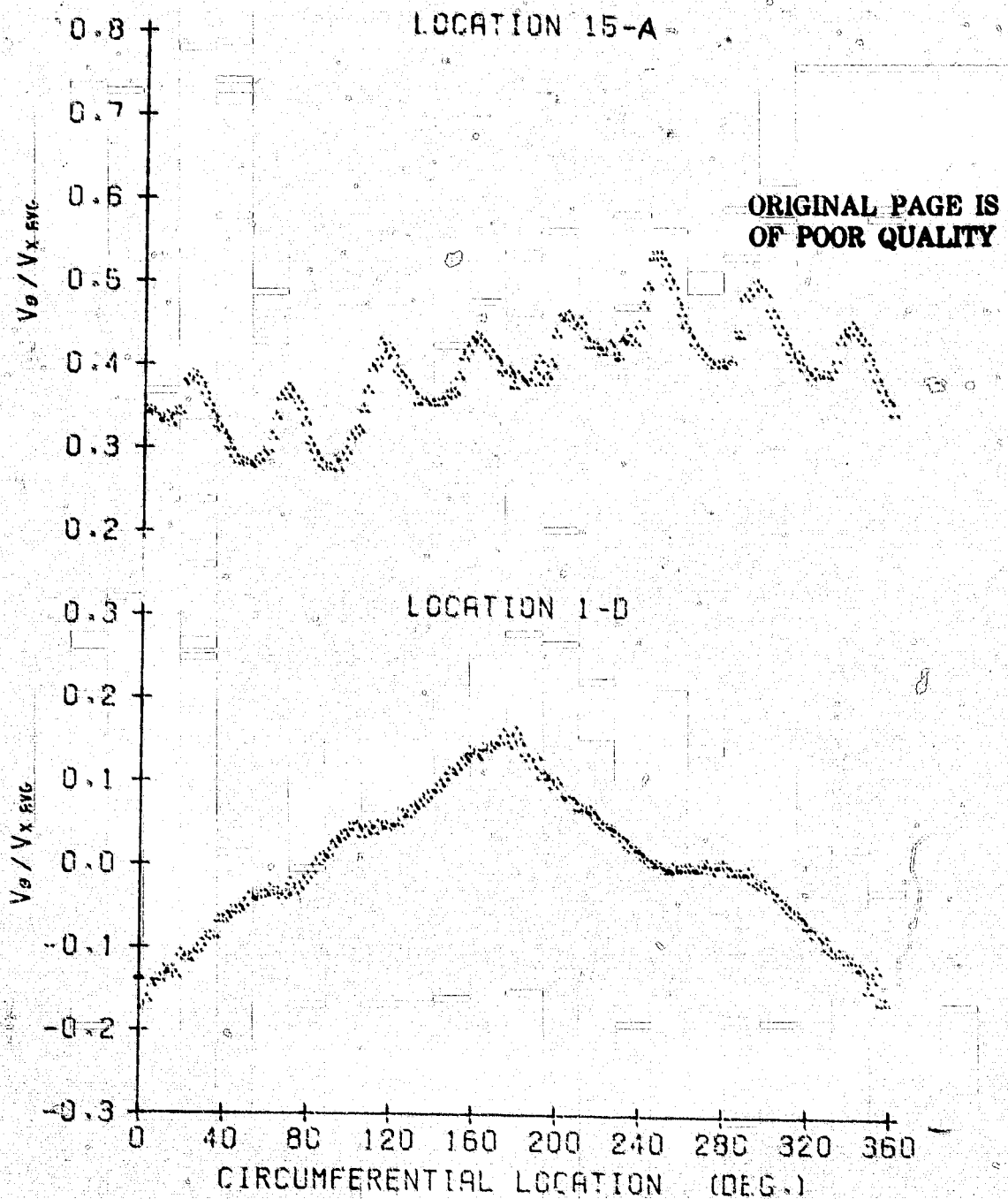


Figure G.68

10 October 1978
LCB:jep

9 BLADES

50 DEG. STAGGER ANGLE

180 DEG. SQ. DISTORTION

RPM = 1515

AVG. FLOW COEF. = 0.606

AVG. P-RISE COEF. = 1.268

AVG. INCIDENCE = 2.69 DEG.

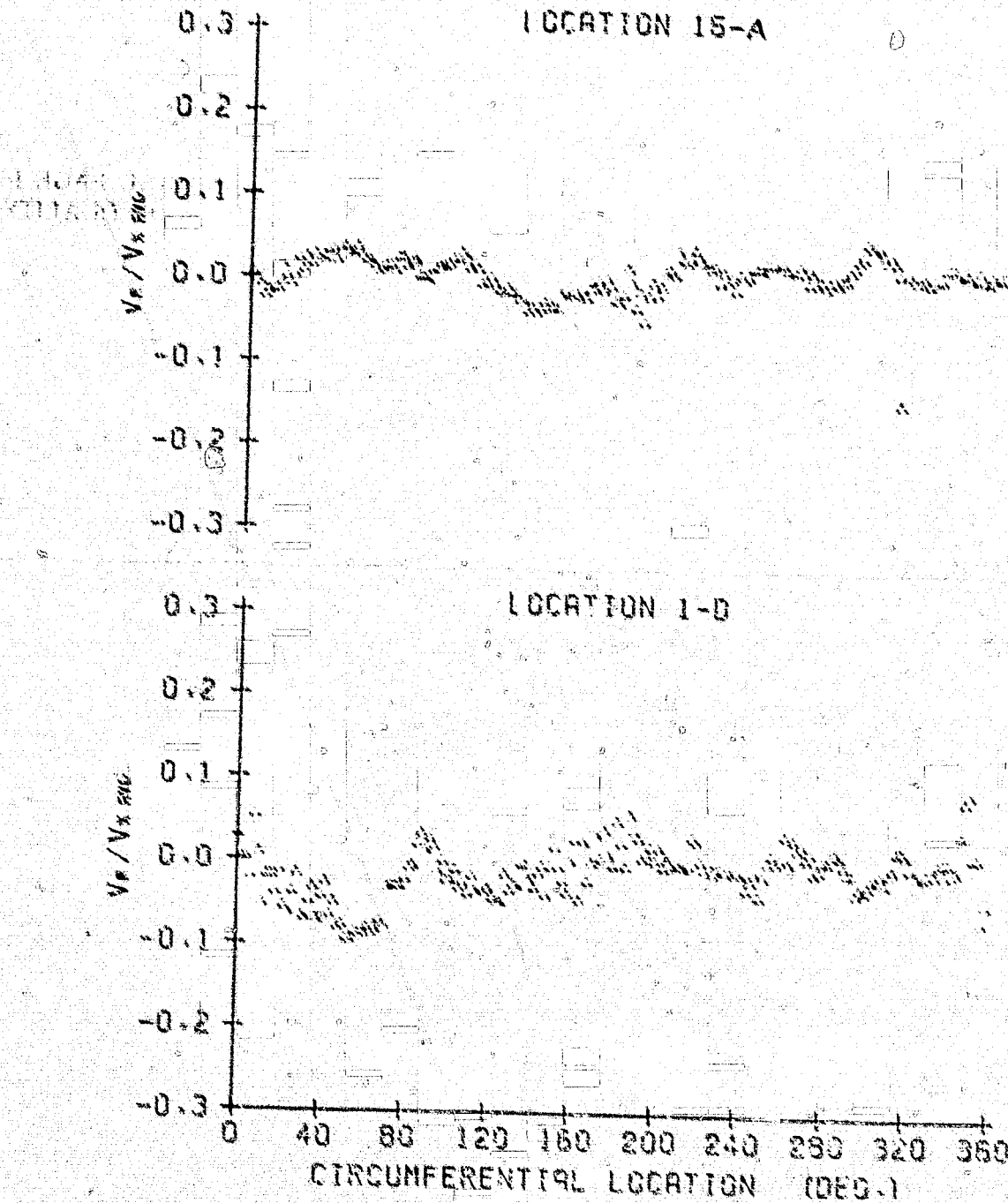


Figure G.69

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1515

AVG. FLOW COEF. = 0.606
AVG. P-RISE COEF. = 1.268
AVG. INCIDENCE = 2.69 DEG.

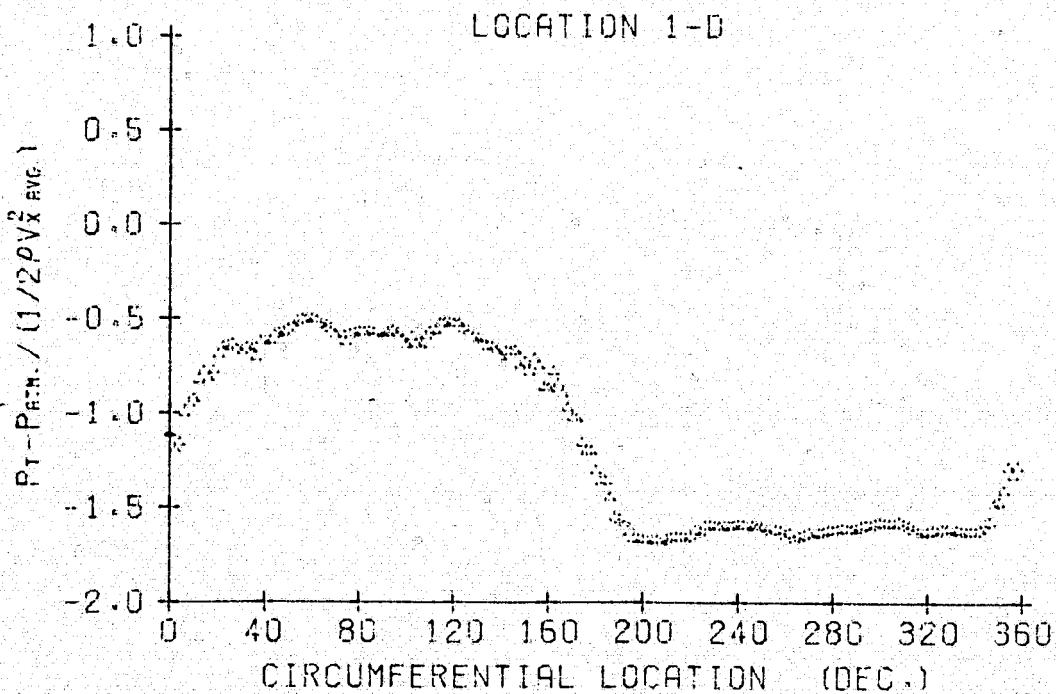
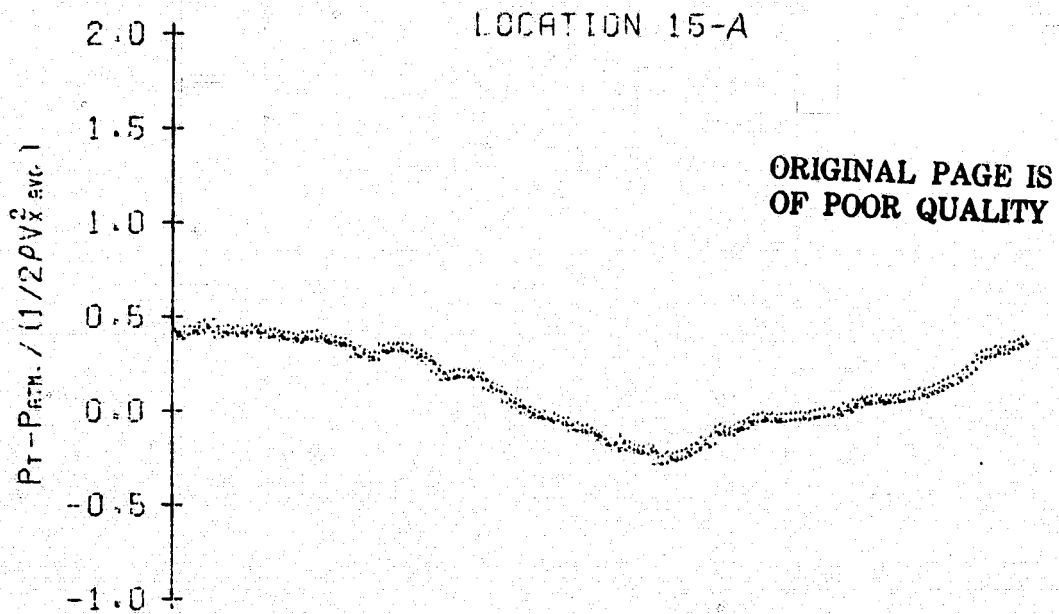


Figure G.70

10 October 1978

LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1515

AVG. FLOW COEF. = 0.606
AVG. P-RISE COEF. = 1.268
AVG. INCIDENCE = 2.69 DEG.

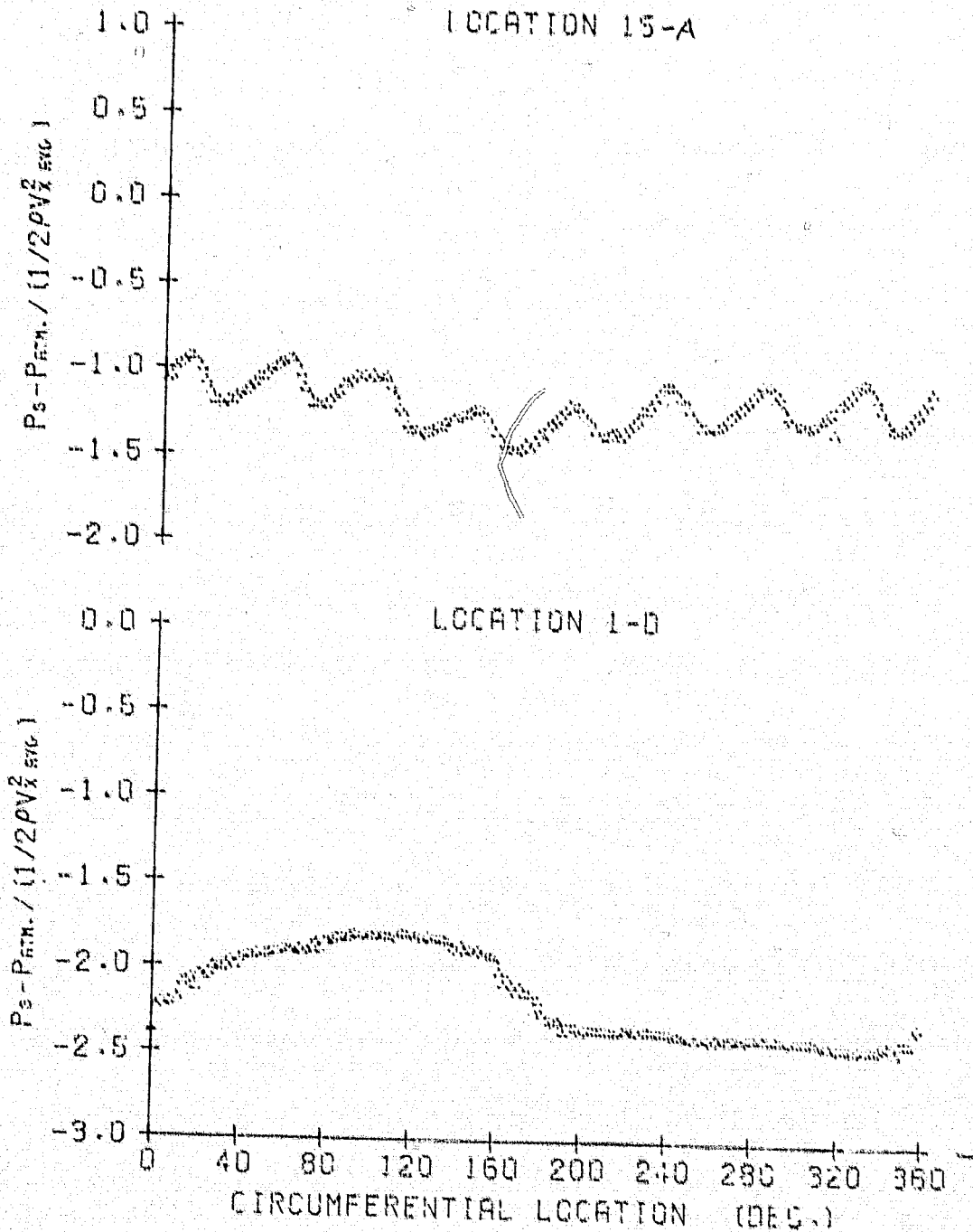


Figure G.71

10 October 1978
LCB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1515

AVG. FLOW COEF. = 0.606
AVG. P-RISE COEF. = 1.268
AVG. INCIDENCE = 2.69 DEG.

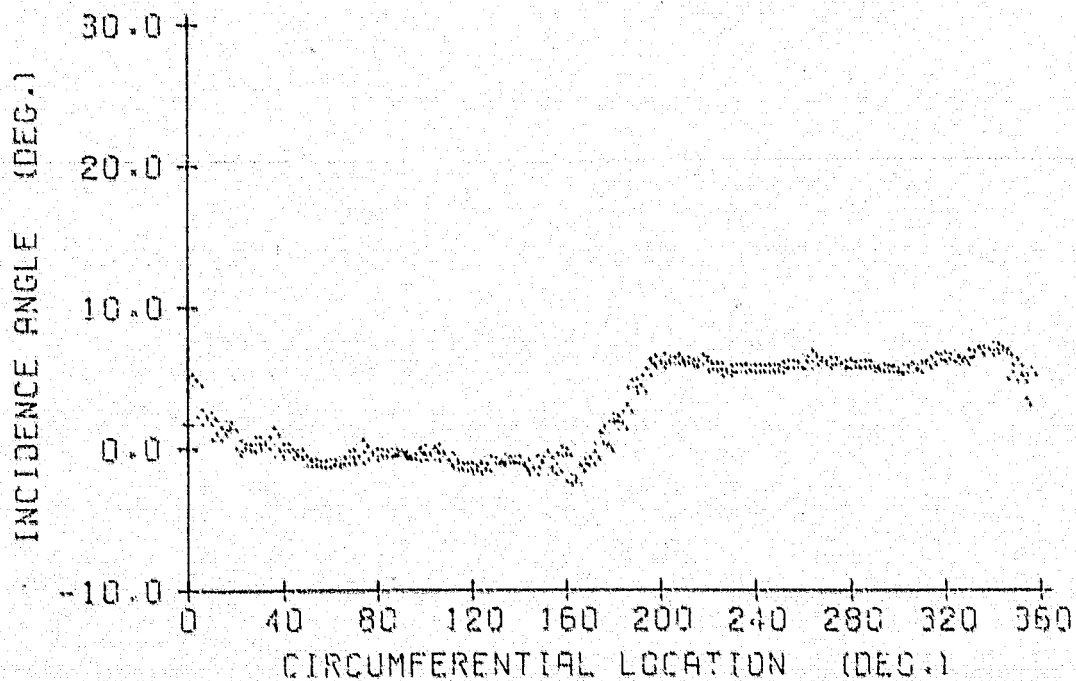


Figure G.72

10 October 1978

LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1688

AVG. FLOW COEF. = 0.579

AVG. P-RISE COEF. = 1.762

AVG. INCIDENCE = 3.75 DEG.

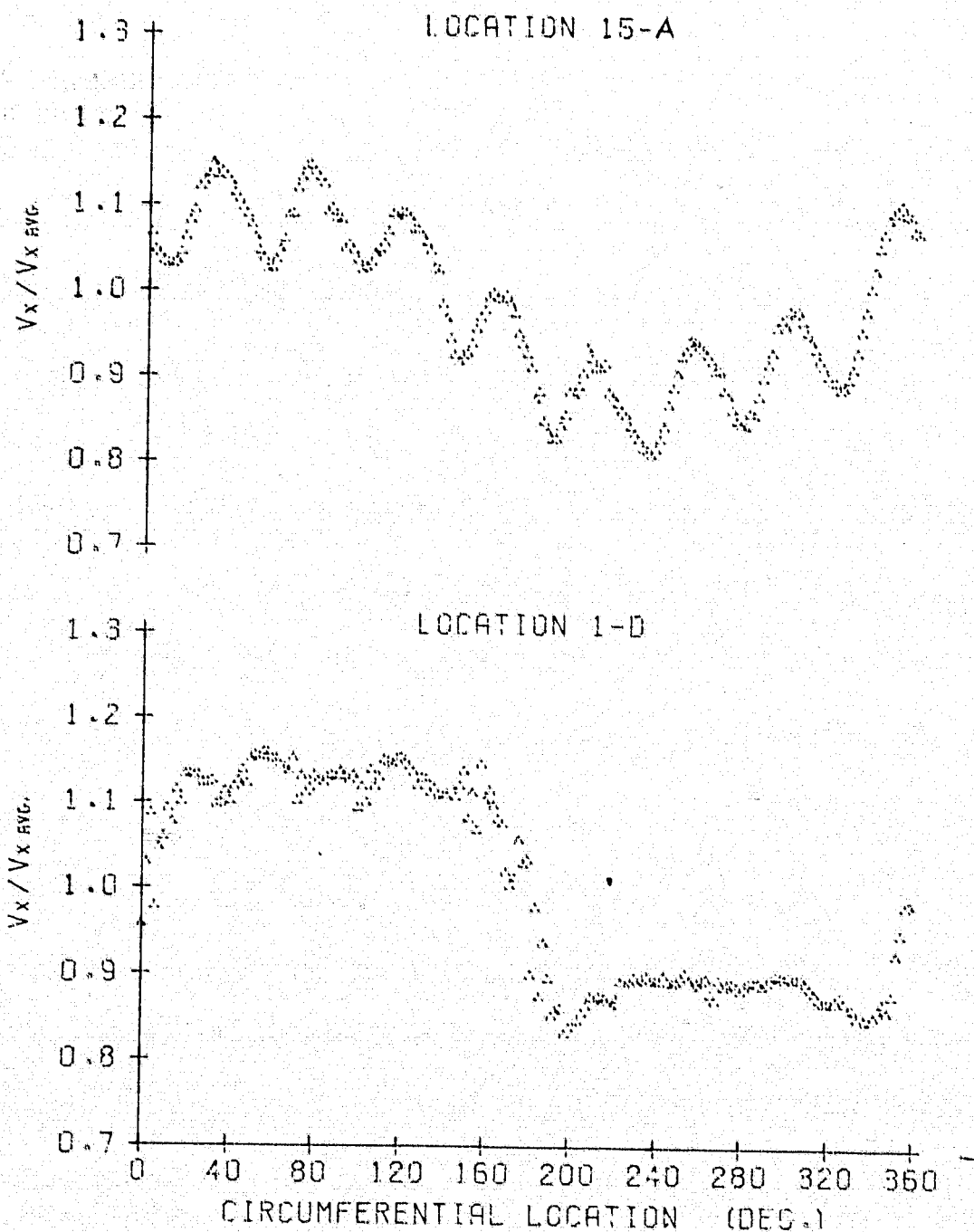


Figure G.73

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1688

AVG. FLOW COEF. = 0.579
AVG. P-RISE COEF. = 1.762
AVG. INCIDENCE = 3.75 DEG.

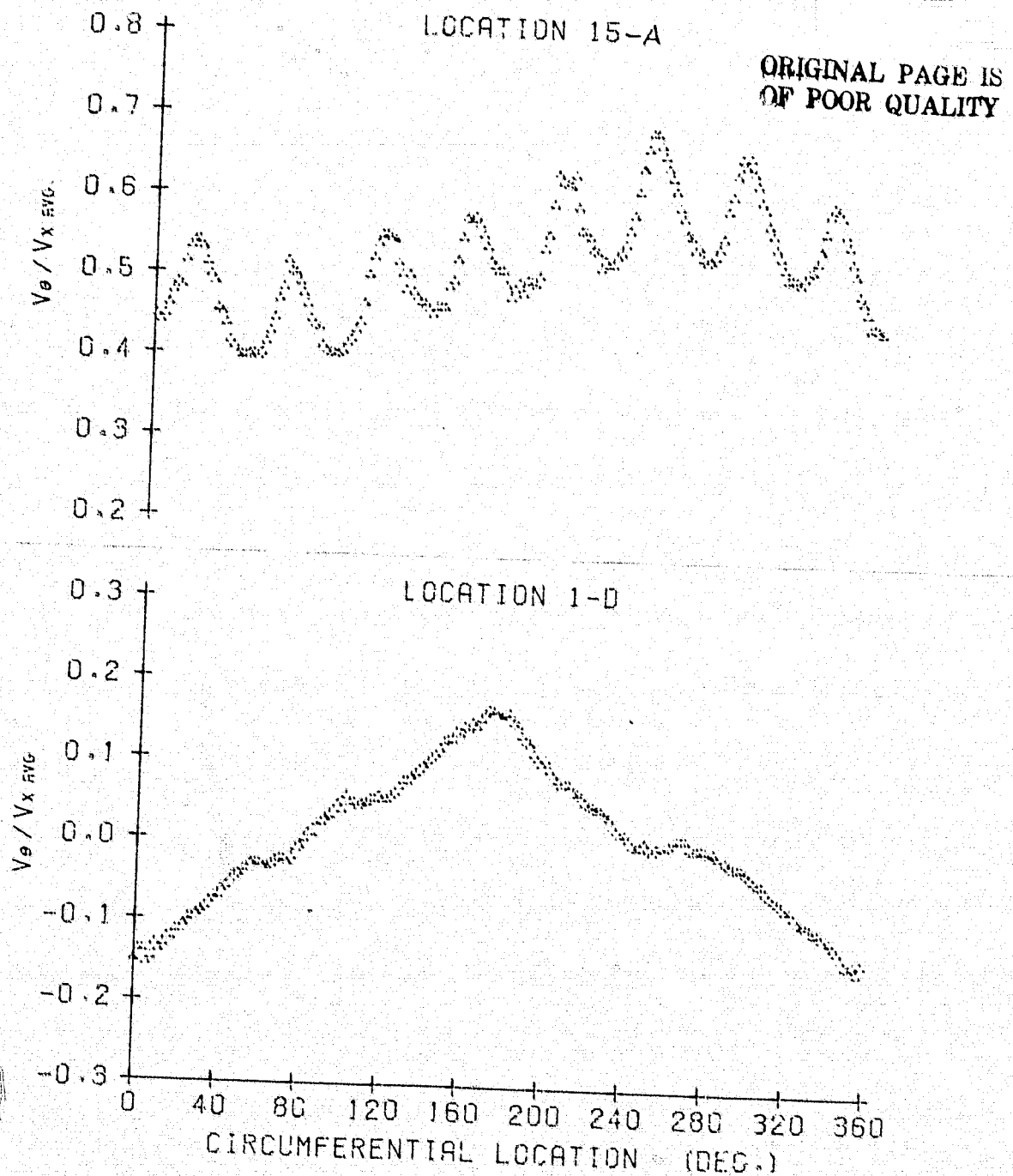


Figure G.74

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1688
AVG. FLOW COEF. = 0.579
AVG. P-RISE COEF. = 1.762
AVG. INCIDENCE = 3.75 DEG.

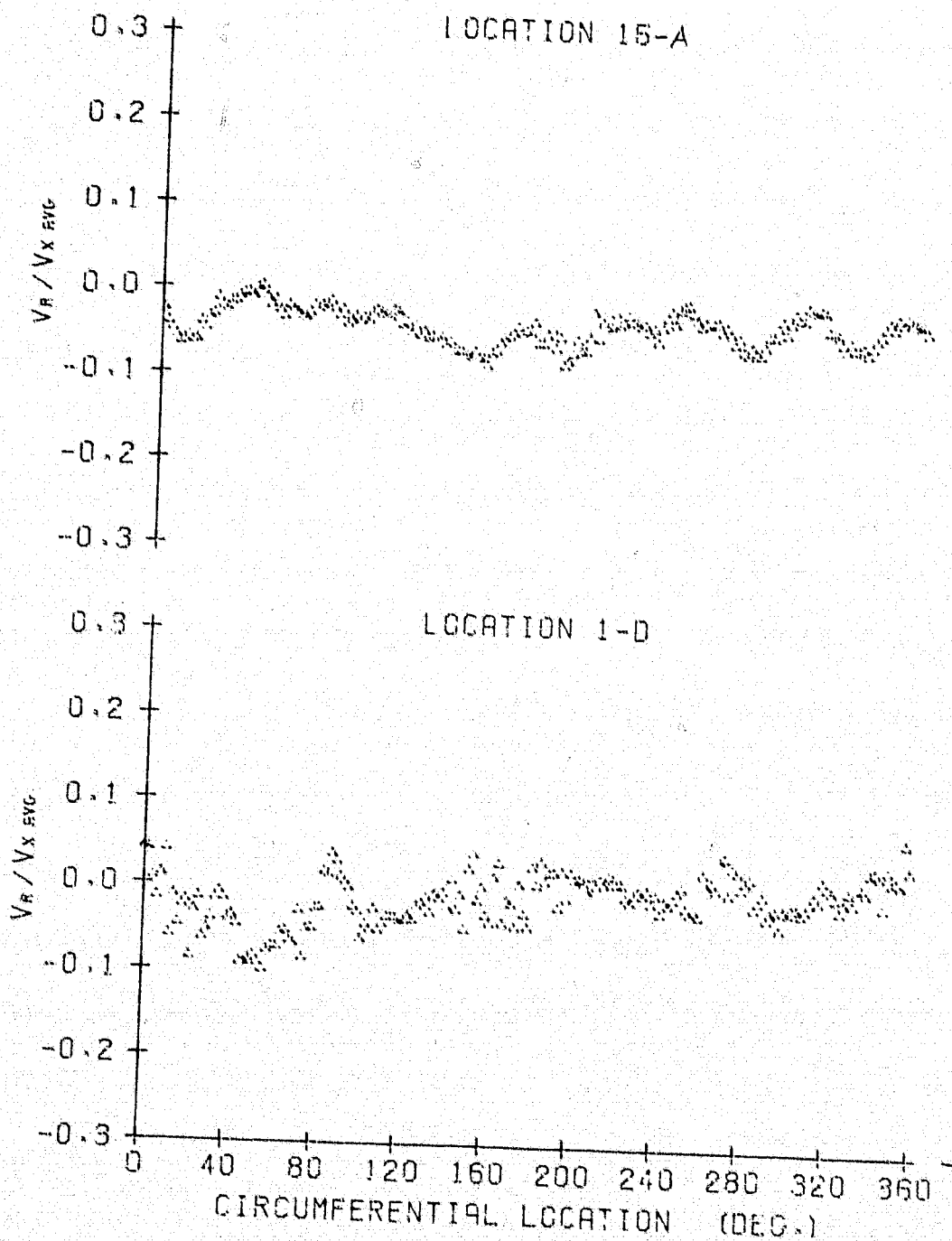


Figure G.75

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1688

AVG. FLOW COEF. = 0.579
AVG. P-RISE COEF. = 1.762
AVG. INCIDENCE = 3.75 DEG.

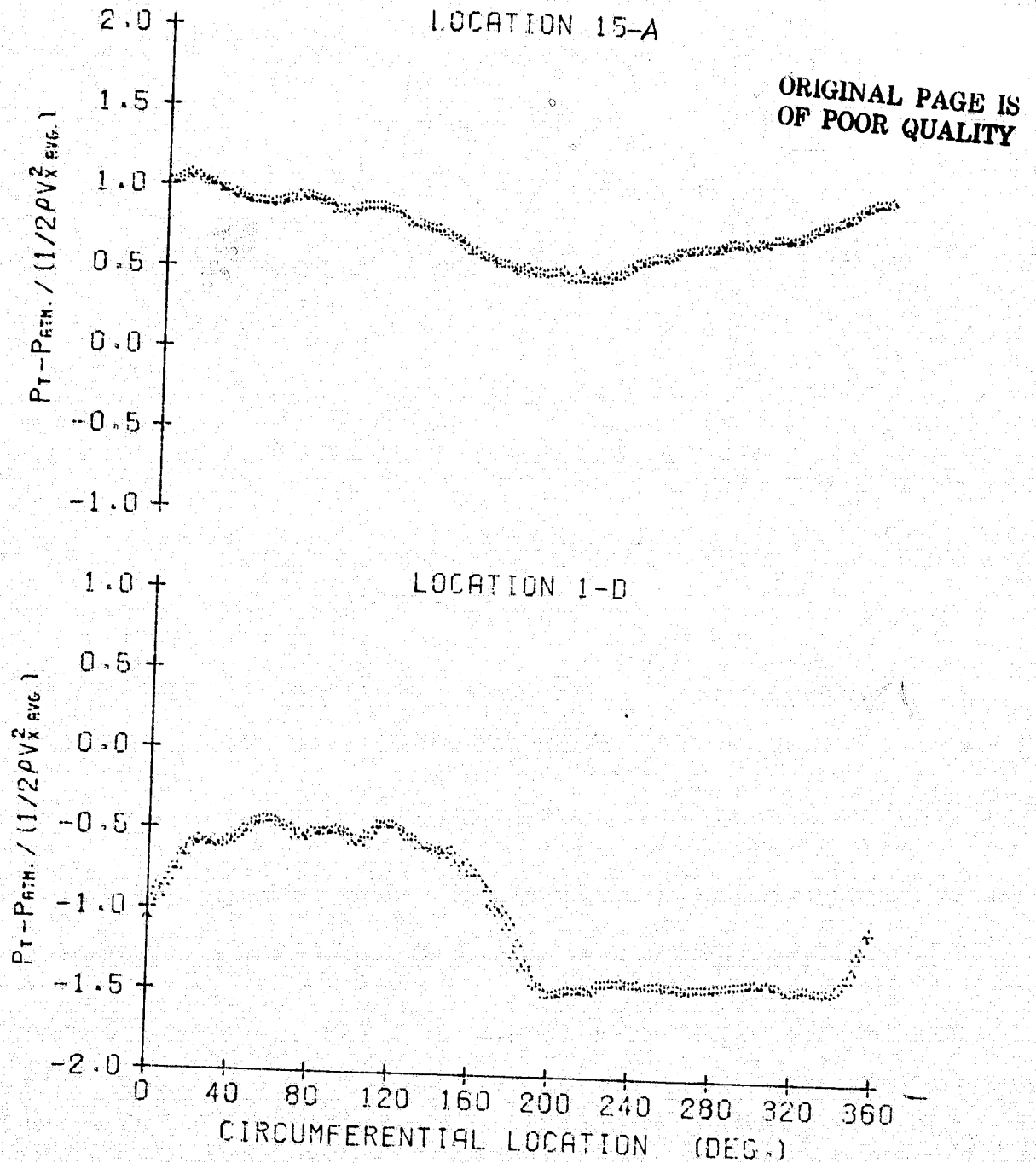


Figure G.76

9 BLADES
 50 DEG. STAGGER ANGLE
 180 DEG. SQ. DISTORTION
 RPM = 1688

AVG. FLOW COEF. = 0.579
 AVG. P-RISE COEF. = 1.762
 AVG. INCIDENCE = 3.75 DEG.

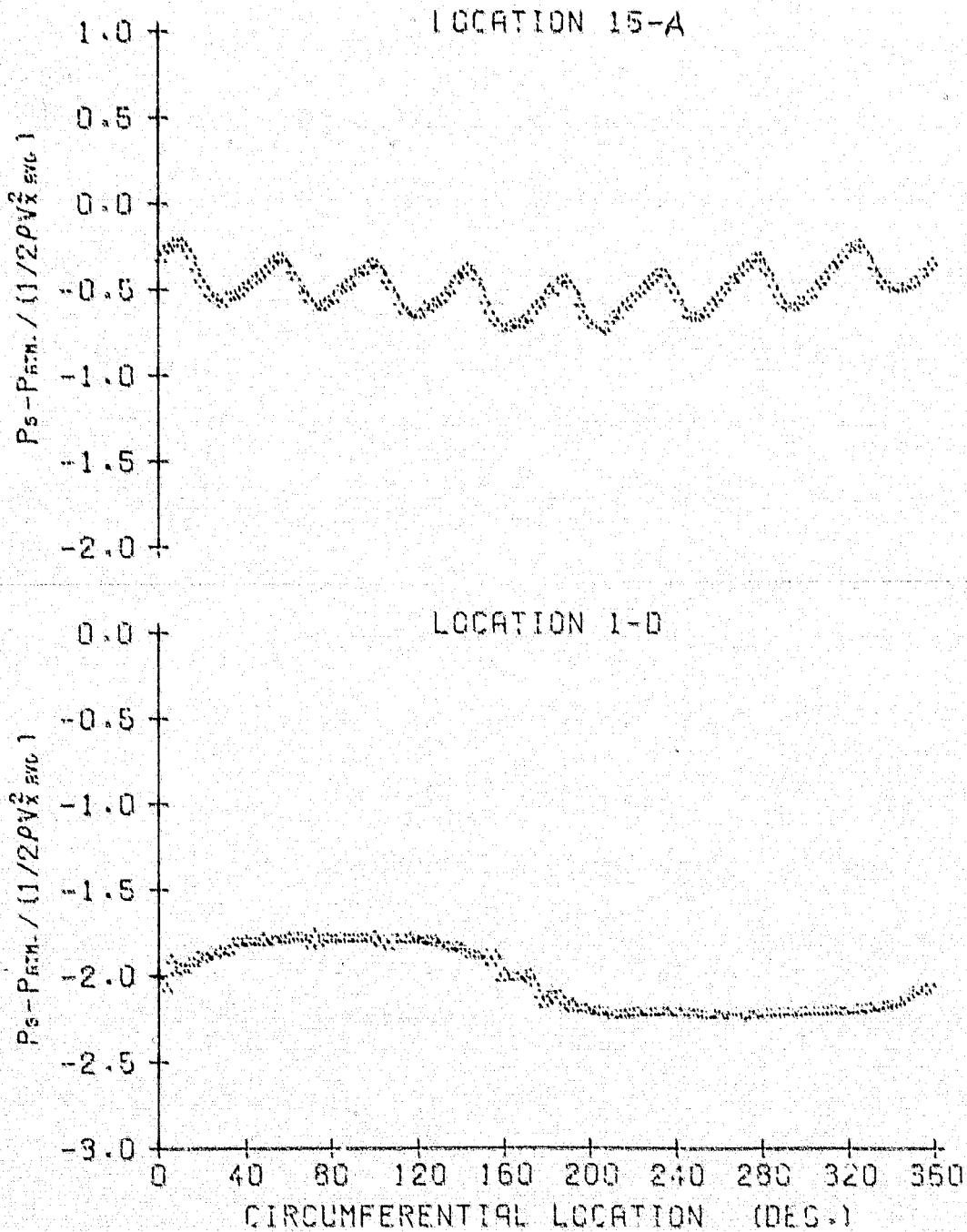


Figure G.77

10 October 1978
LCB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1688

AVG. FLOW COEF. = 0.579
AVG. P-RISE COEF. = 1.762
AVG. INCIDENCE = 3.75 DEG.

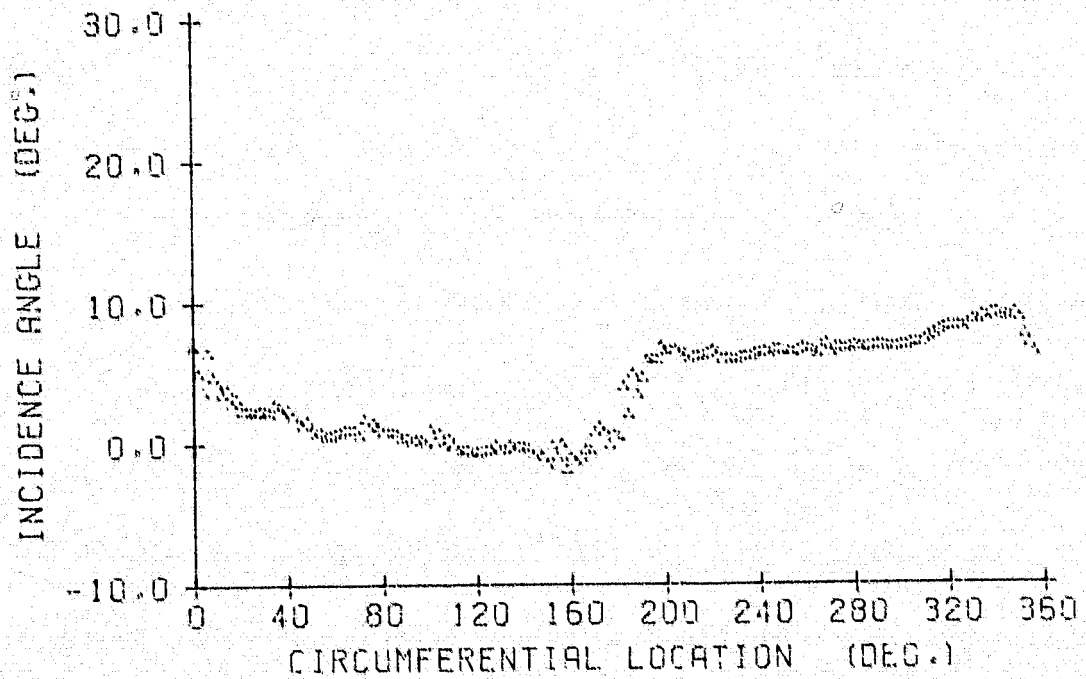


Figure G.78

10 October 1978

LCB:jep

0 BLADES
 50 DEG. STAGGER ANGLE
 180 DEG. SQ. DISTORTION
 RPM = 1825

AVG. FLOW COEF. = 0.550

AVG. P-RISE COEF. = 2.355

AVG. INCIDENCE = 5.94 DEG.

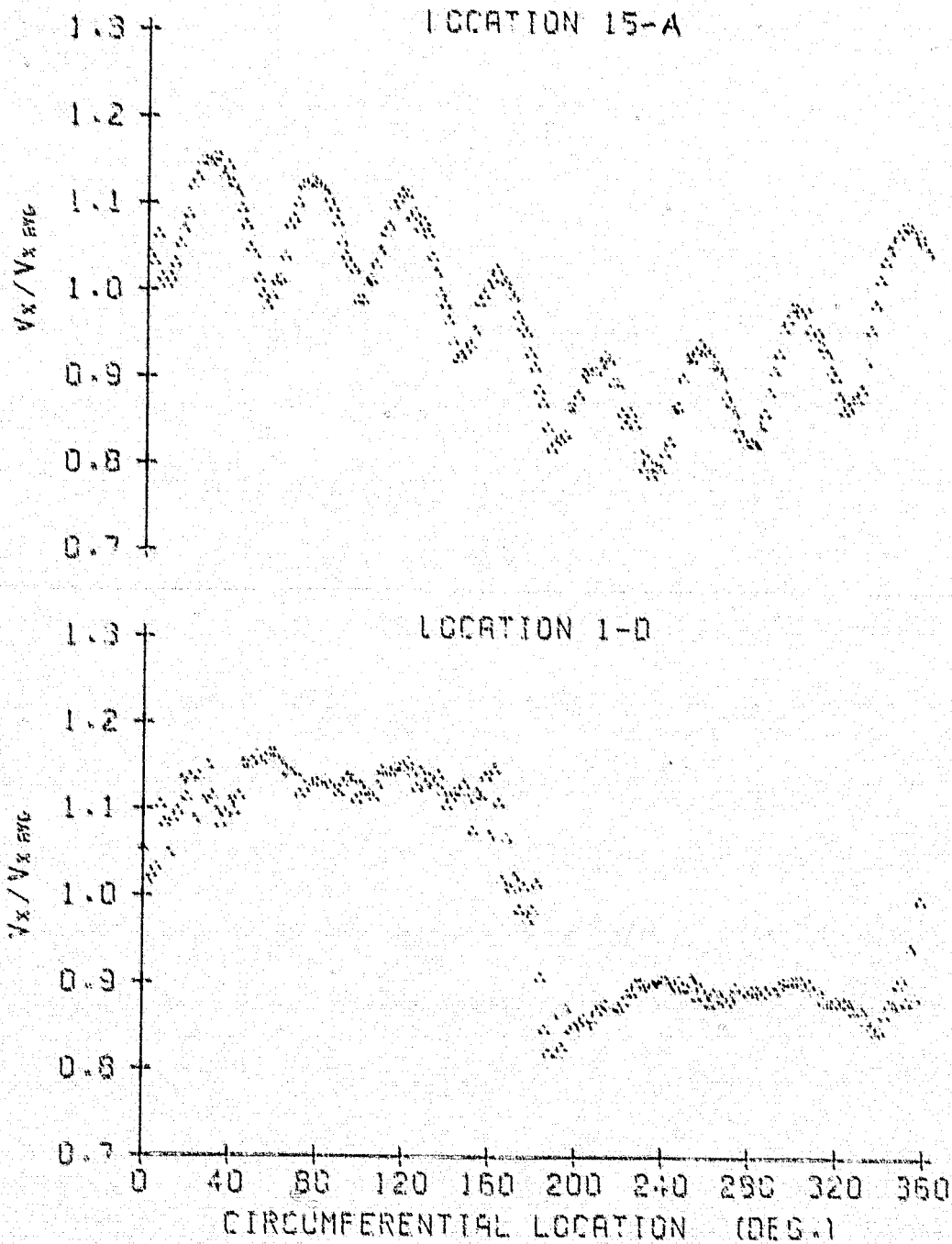


Figure G.79

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1825

AVG. FLOW COEF. = 0.530
AVG. P-RISE COEF. = 2.355
AVG. INCIDENCE = 5.94 DEG.

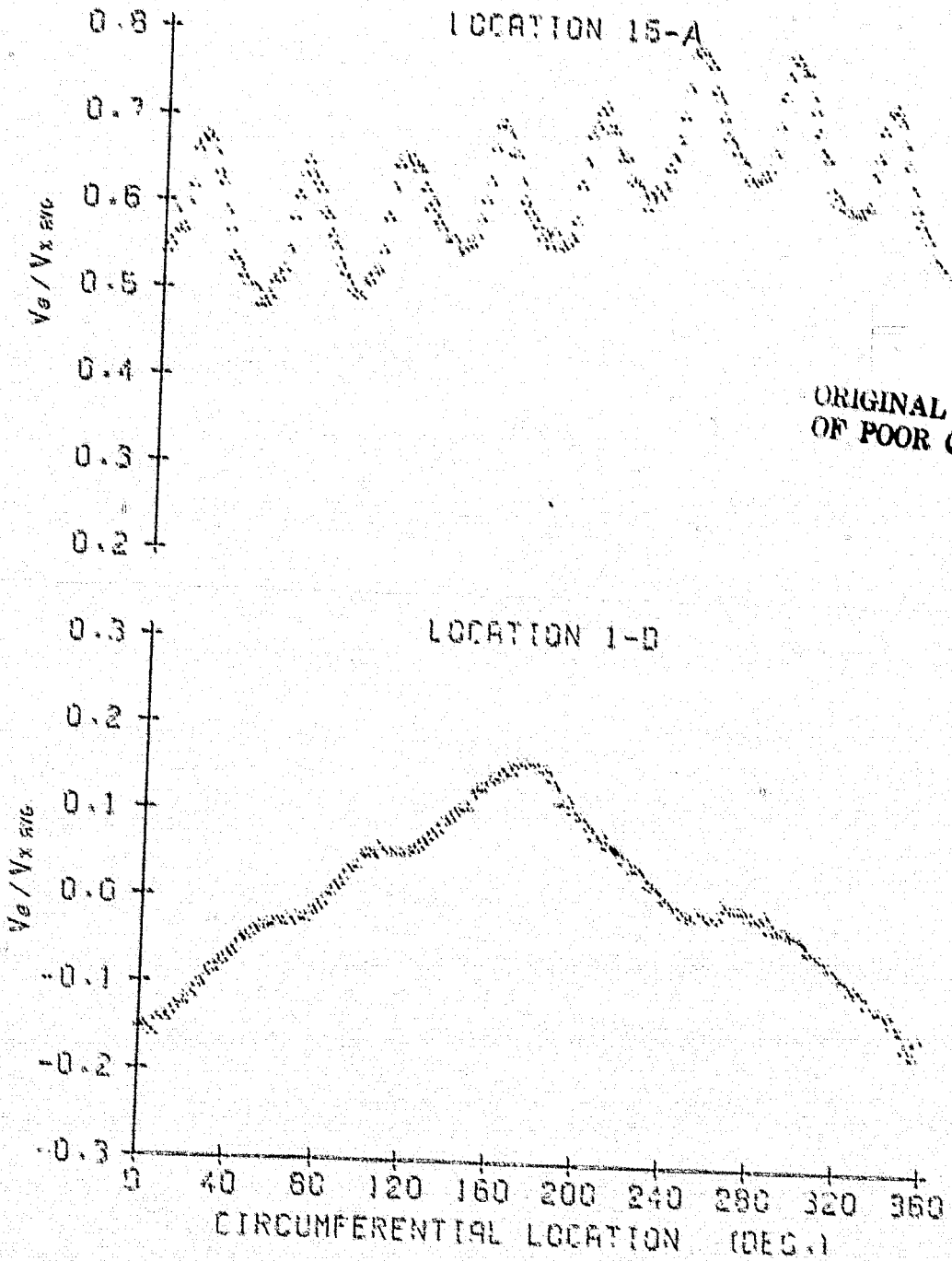


Figure G.80

10 October 1978
LGB:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1825

AVG. FLOW COEF. = 0.530
AVG. P-RISE COEF. = 2.356
AVG. INCIDENCE = 5.94 DEG.

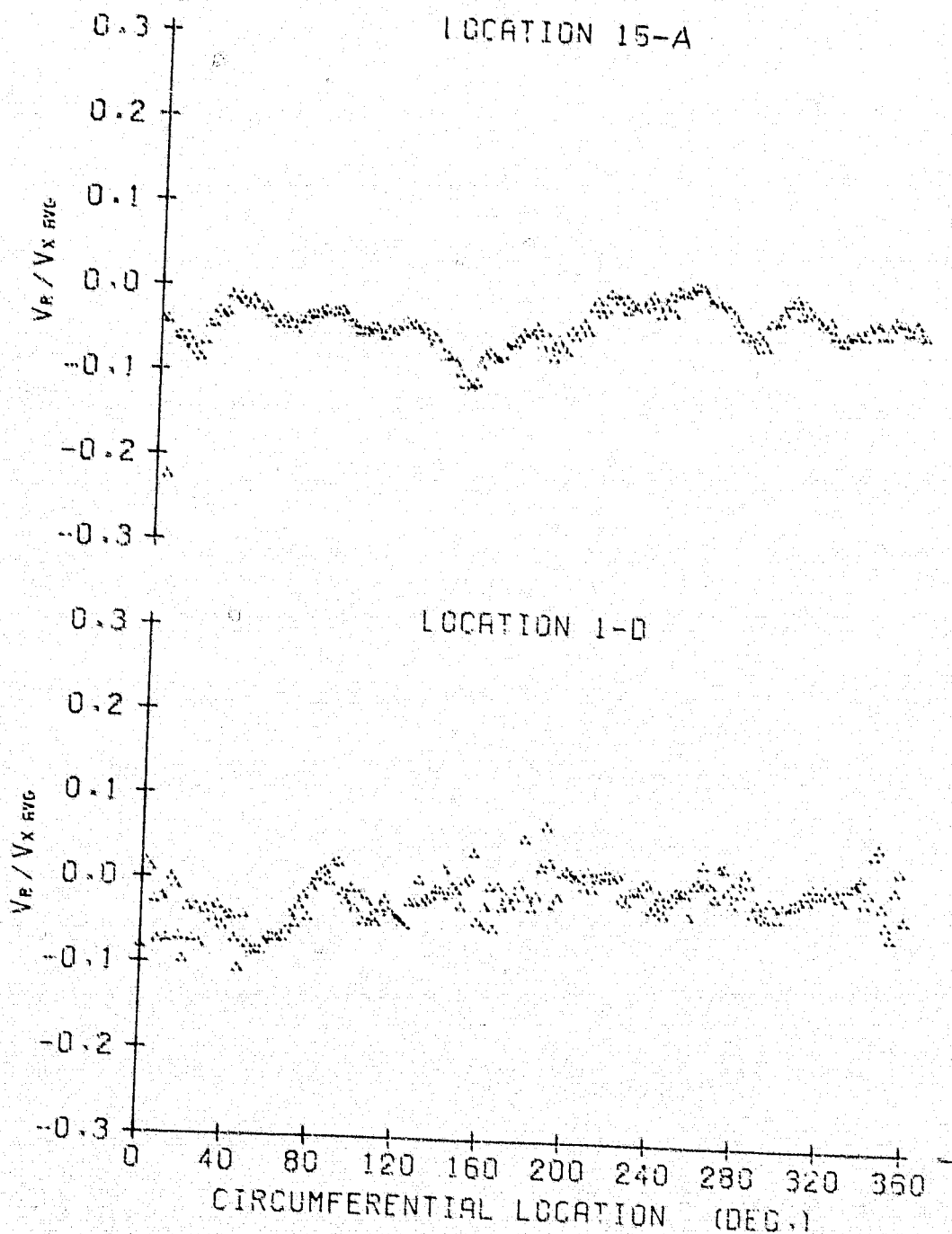


Figure G.81

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SS. DISTORTION
RPM = 1825

AVG. FLOW COEF. = 0.530
AVG. P-RISE COEF. = 2.355
AVG. INCIDENCE = 5.94 DEG.

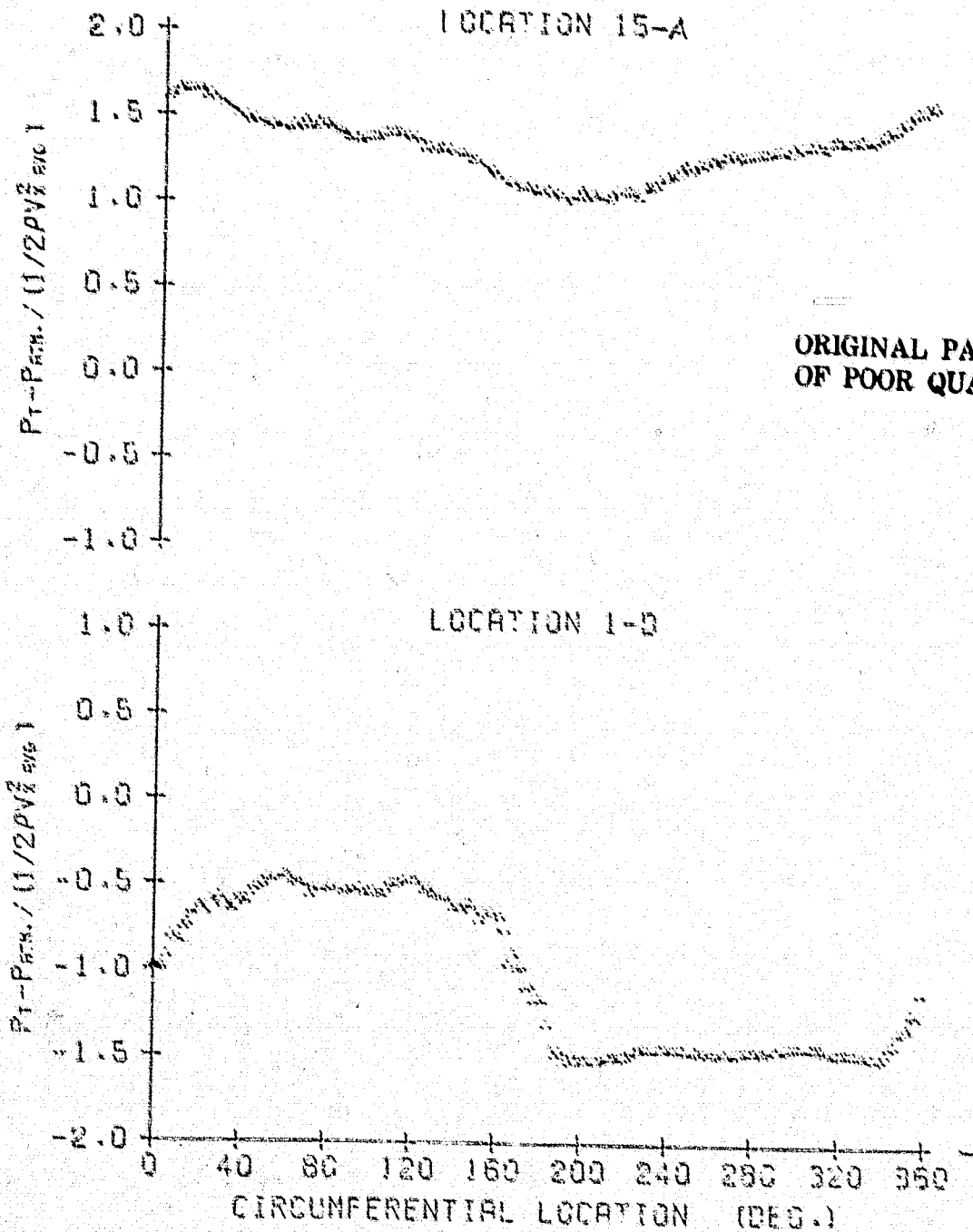


Figure G.82

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1825

AVG. FLOW COEF. = 0.530
AVG. P-RISE COEF. = 2.356
AVG. INCIDENCE = 5.94 DEG.

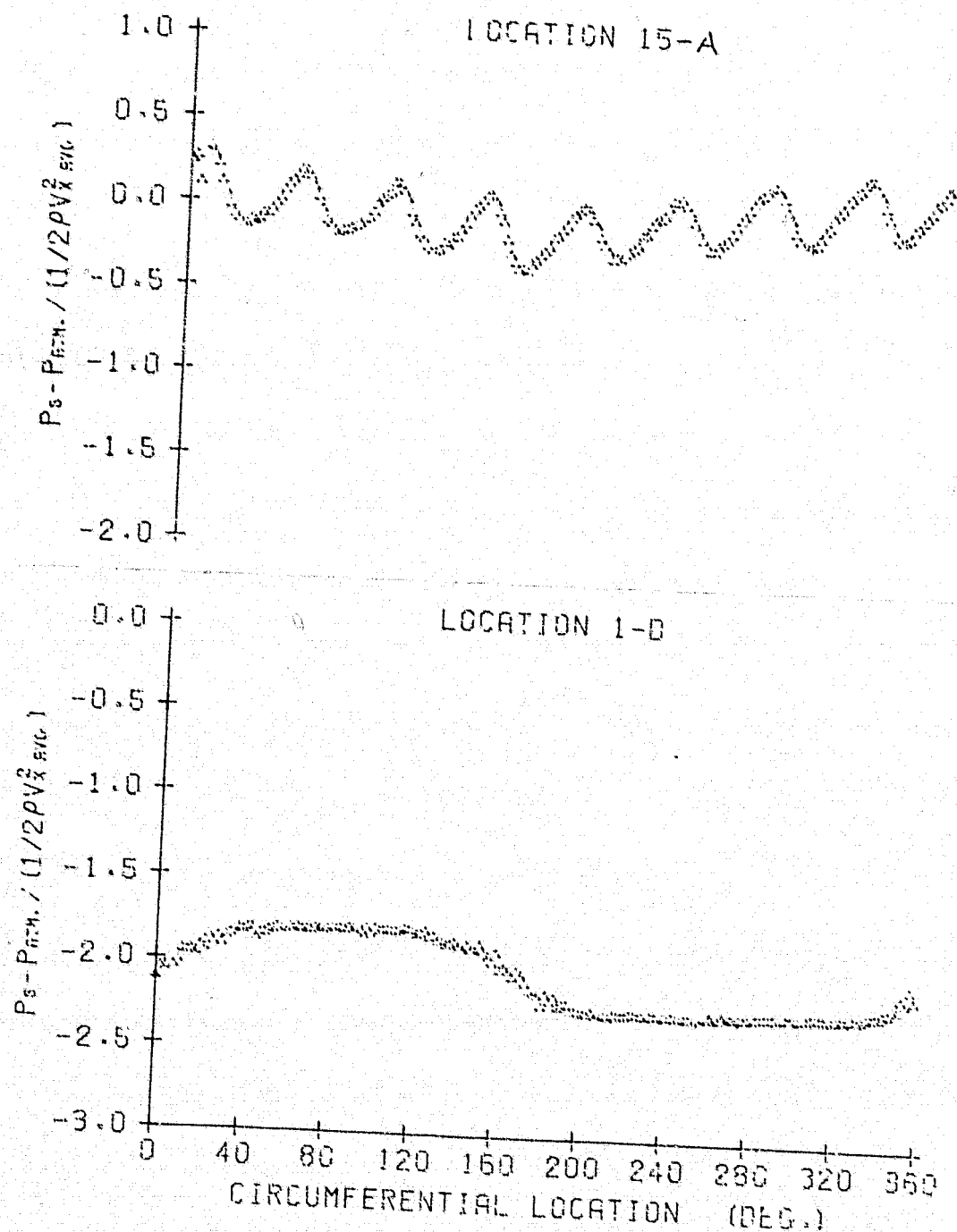


Figure G.83

10 October 1978
LCB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1825

AVG. FLOW COEF. = 0.530
AVG. P-RISE COEF. = 2.356
AVG. INCIDENCE = 5.94 DEG.

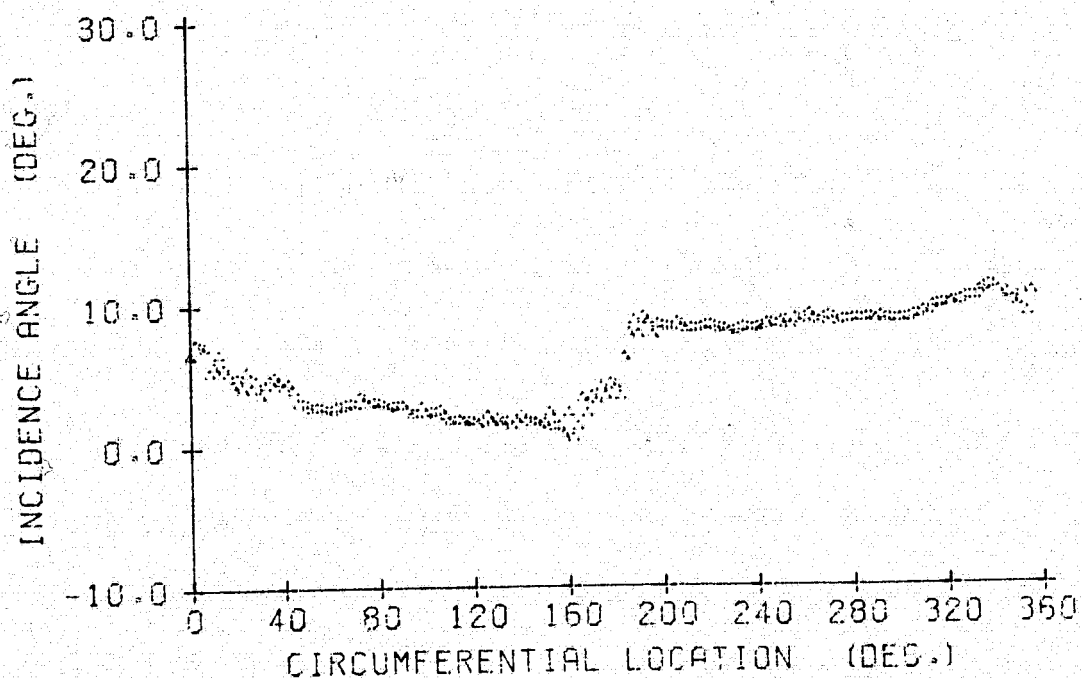


Figure G.84

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1688

AVG. FLOW COEF. = 0.530
AVG. P-RISE COEF. = 2.272
AVG. INCIDENCE = 5.95 DEG.

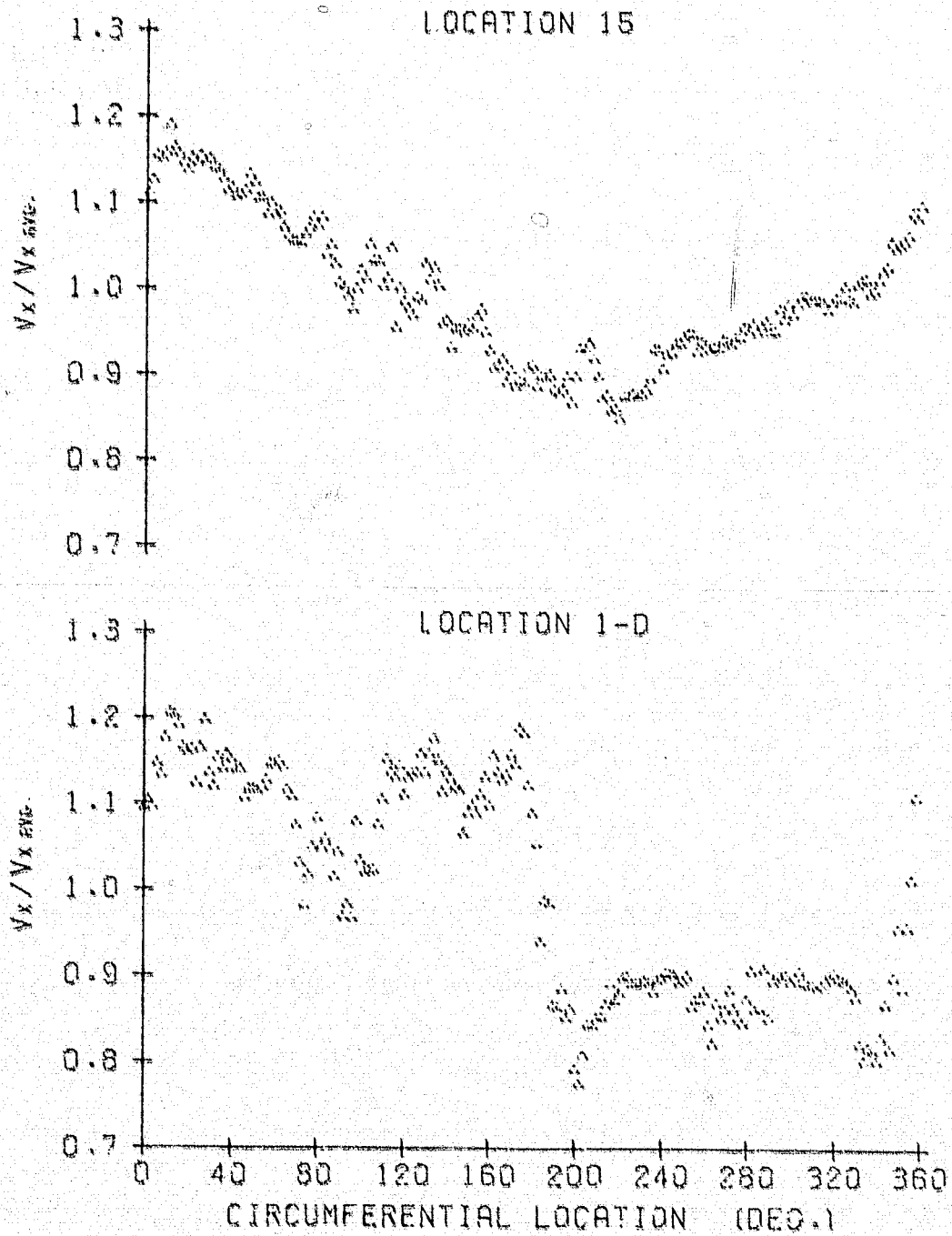


Figure G.85

10 October 1978

LCB:jep

9 BLADES

50 DEG. STAGGER ANGLE

180 DEG. SQ. DISTORTION

RPM = 1688

AVG. FLOW COEF. = 0.530

AVG. P-RISE COEF. = 2.272

AVG. INCIDENCE = 5.95 DEG.

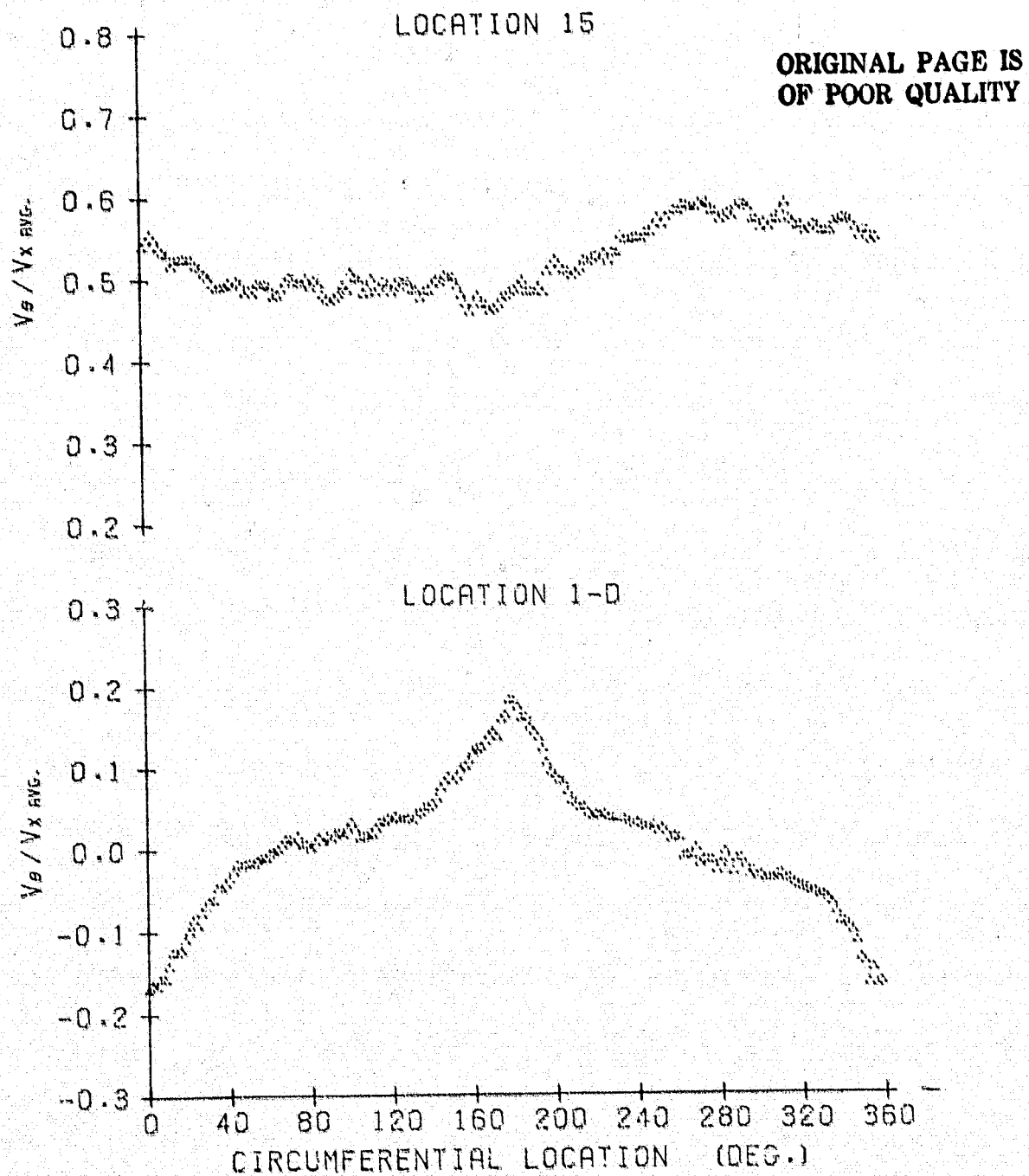


Figure G.86

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1688
AVG. FLOW COEF. = 0.530
AVG. P-RISE COEF. = 2.272
AVG. INCIDENCE = 5.95 DEG.

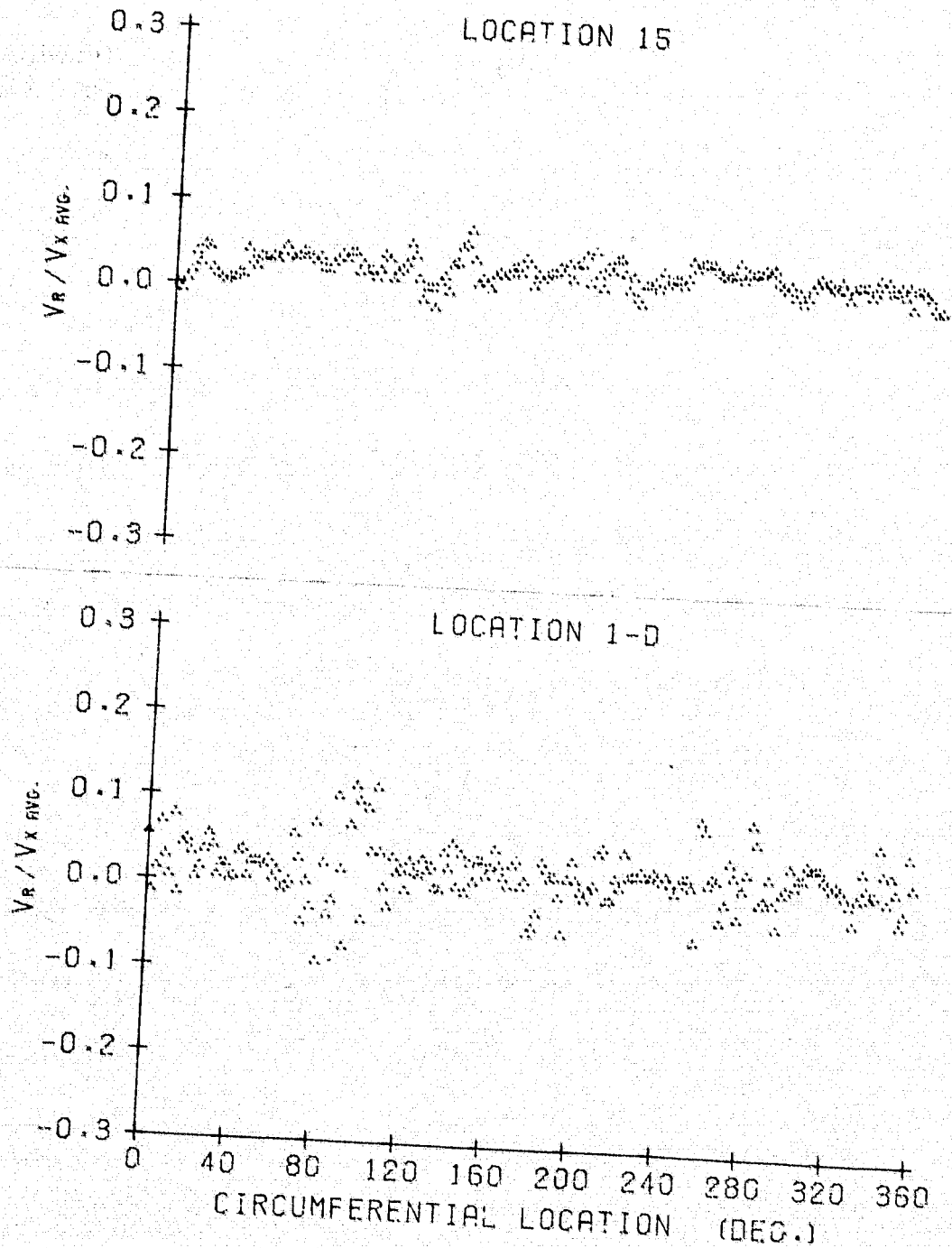


Figure G.87

10 October 1978
LGB:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1688

AVG. FLOW COEF. = 0.530
AVG. P-RISE COEF. = 2.272
AVG. INCIDENCE = 5.95 DEG.

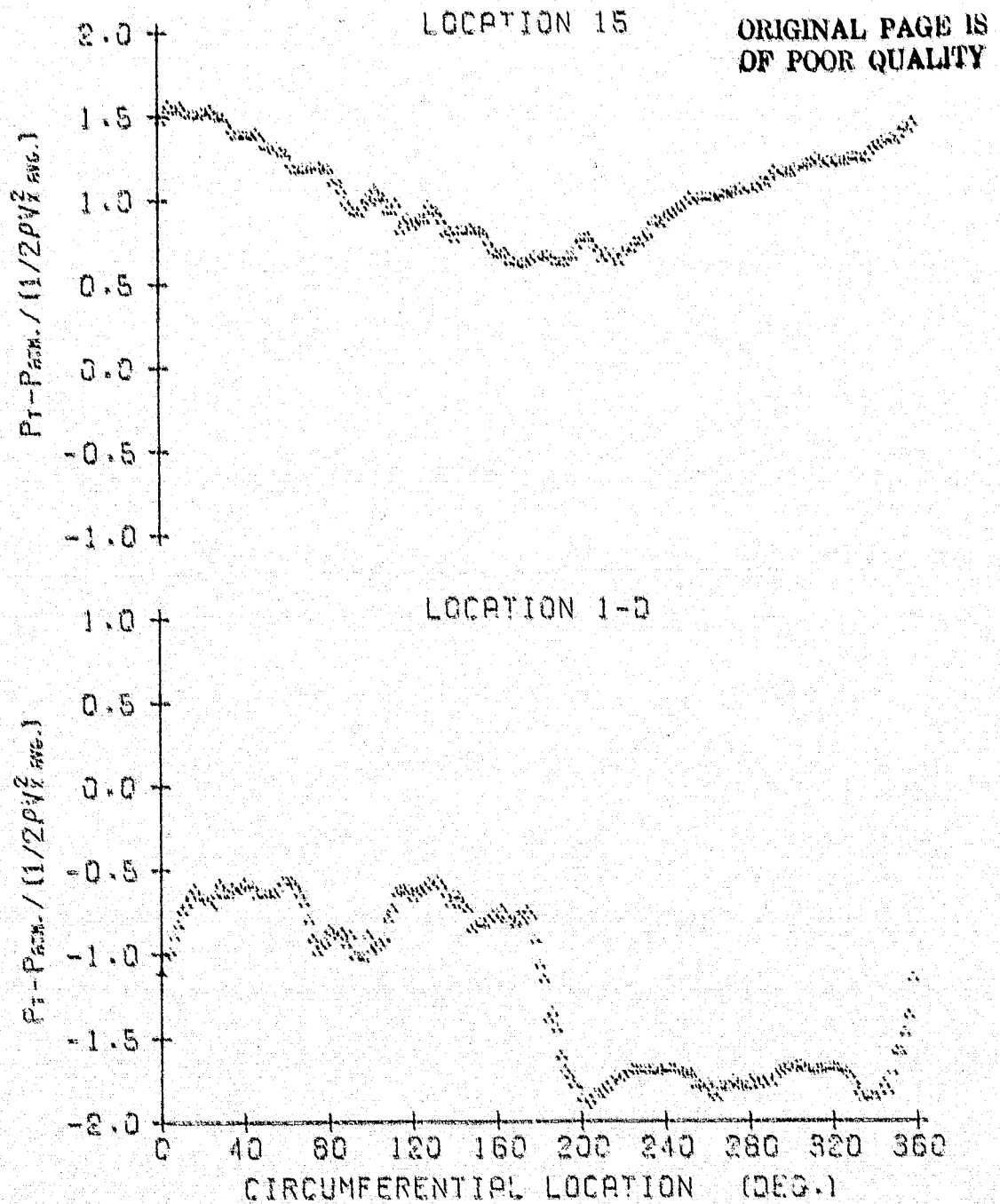


Figure G.99

10 October 1978
LCB:jep

9 BLADES

50 DEG. STAGGER ANGLE

180 DEG. SQ. DISTORTION

RPM = 1688

AVG. FLOW COEF. = 0.530

AVG. P-RISE COEF. = 2.272

AVG. INCIDENCE = 5.95 DEG.

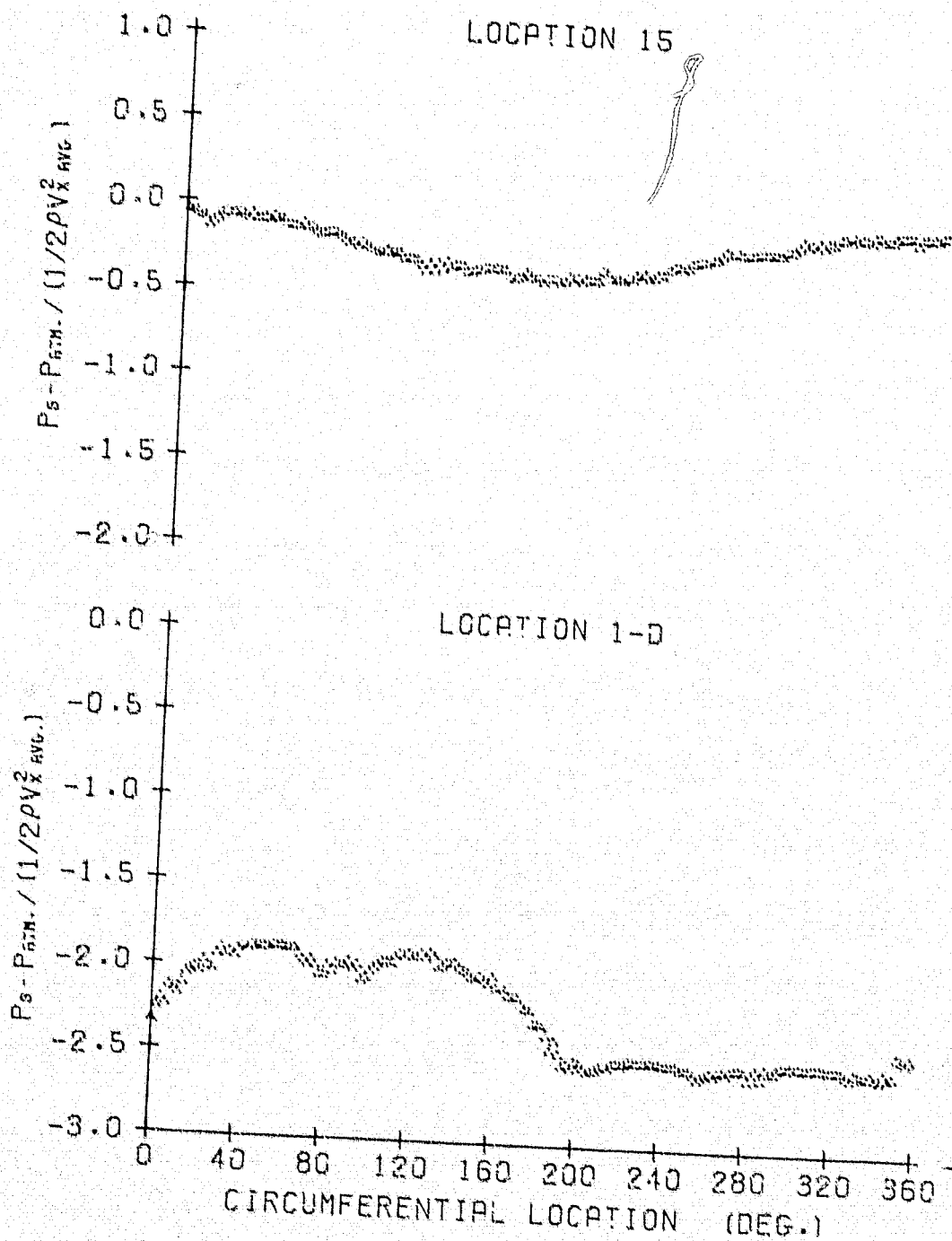


Figure G.89

10 October 1978
LCB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1688
AVG. FLOW COEF. = 0.530
AVG. P-RISE COEF. = 2.272
AVG. INCIDENCE = 5.95 DEG.

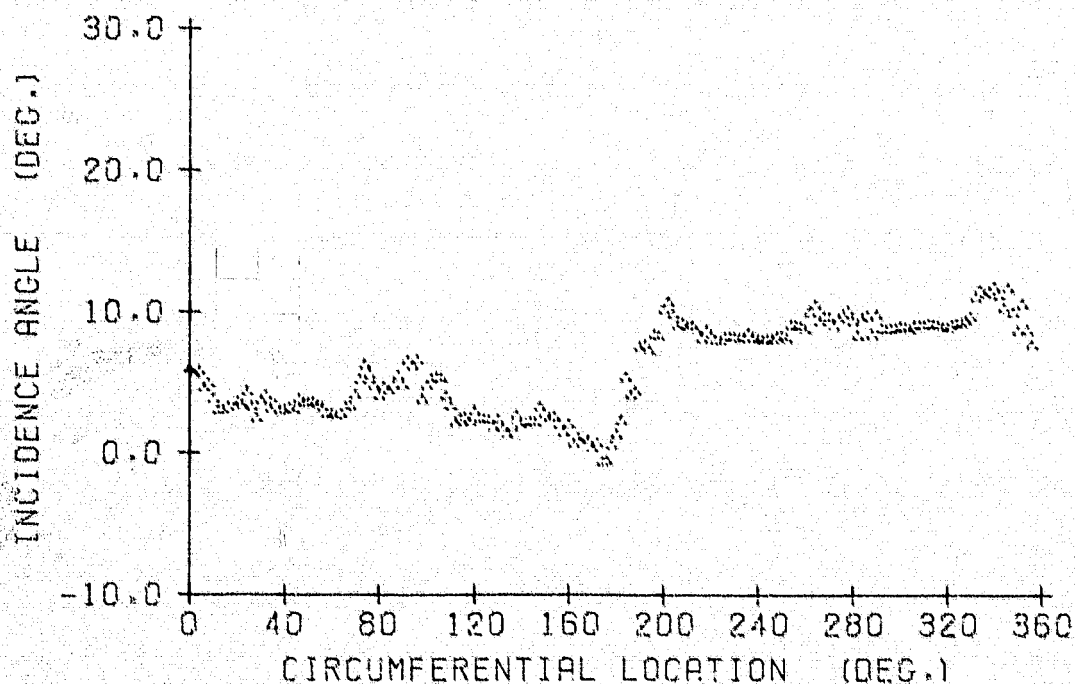


Figure G.90

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1698
AVG. FLOW COEF. = 0.583
AVG. P-RISE COEF. = 1.807
AVG. INCIDENCE = 3.66 DEG.

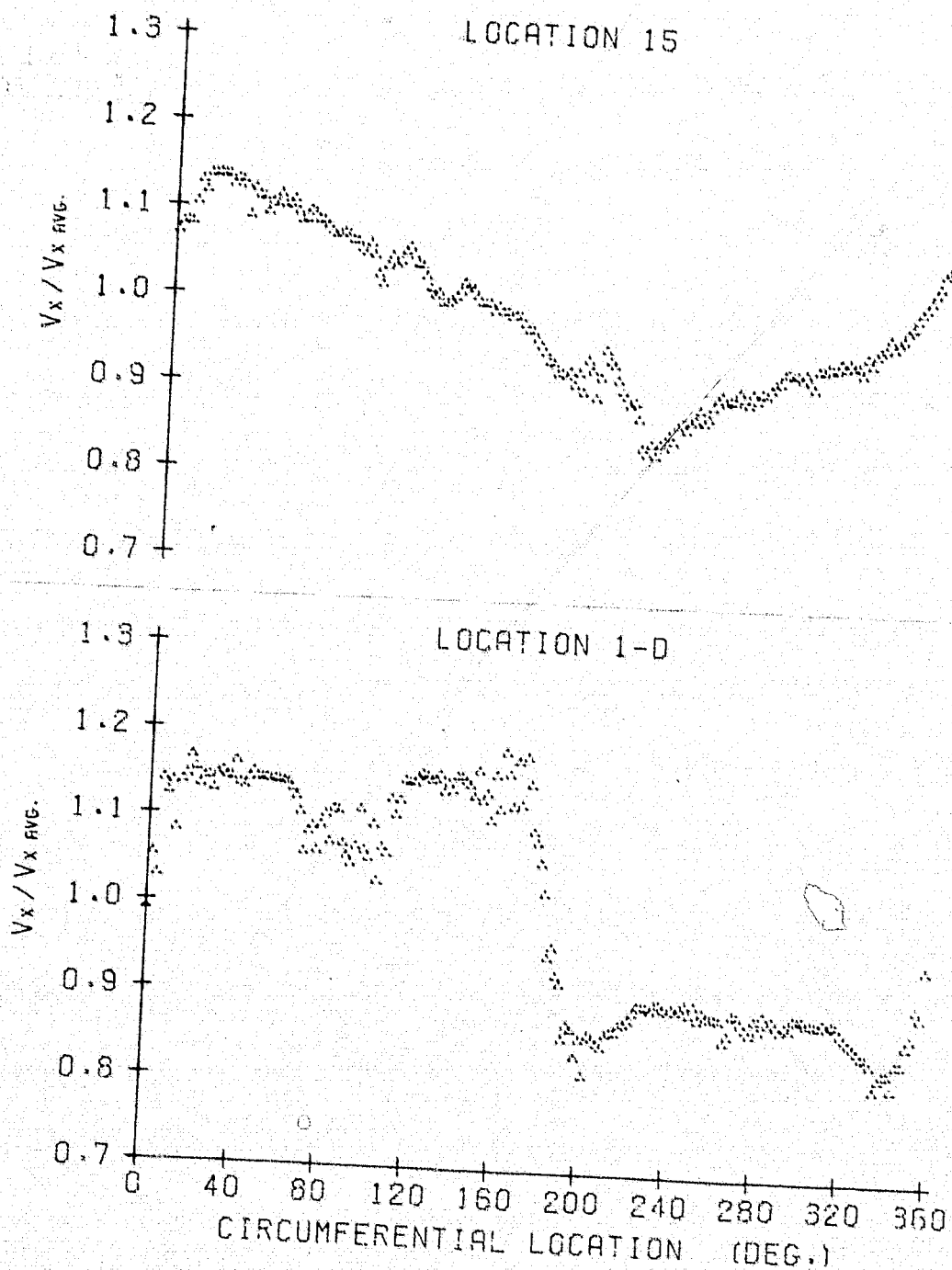


Figure G.91

10 October 1978

LCB:jep

9 BLADES

50 DEG. STAGGER ANGLE

180 DEG. SQ. DISTORTION

RPM = 1688

AVG. FLOW COEF. = 0.583

AVG. P-RISE COEF. = 1.807

AVG. INCIDENCE = 3.66 DEG.

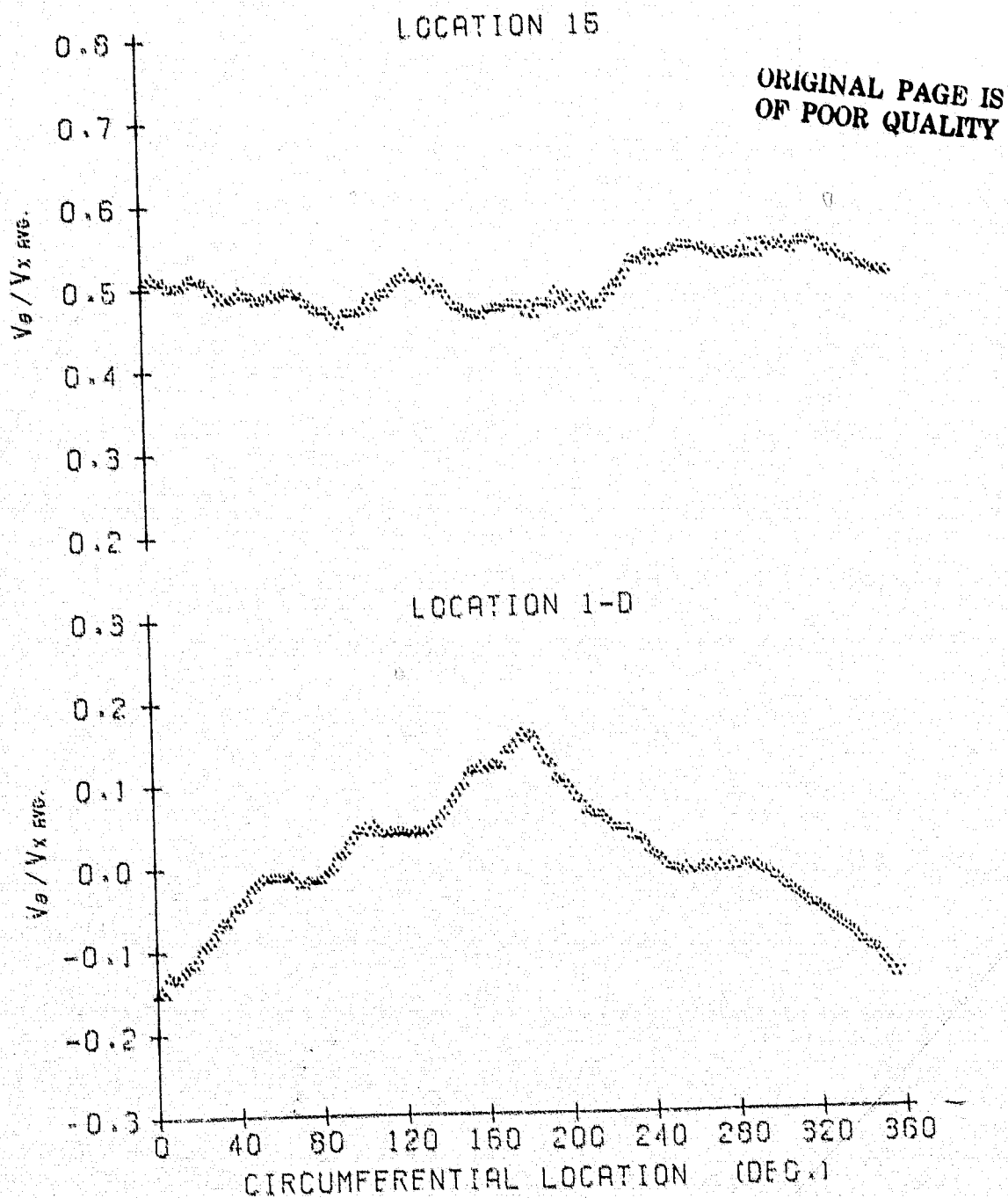


Figure G.92

10 October 1978

LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1688

AVG. FLOW COEF. = 0.583

AVG. P-RISE COEF. = 1.807

AVG. INCIDENCE = 3.66 DEG.

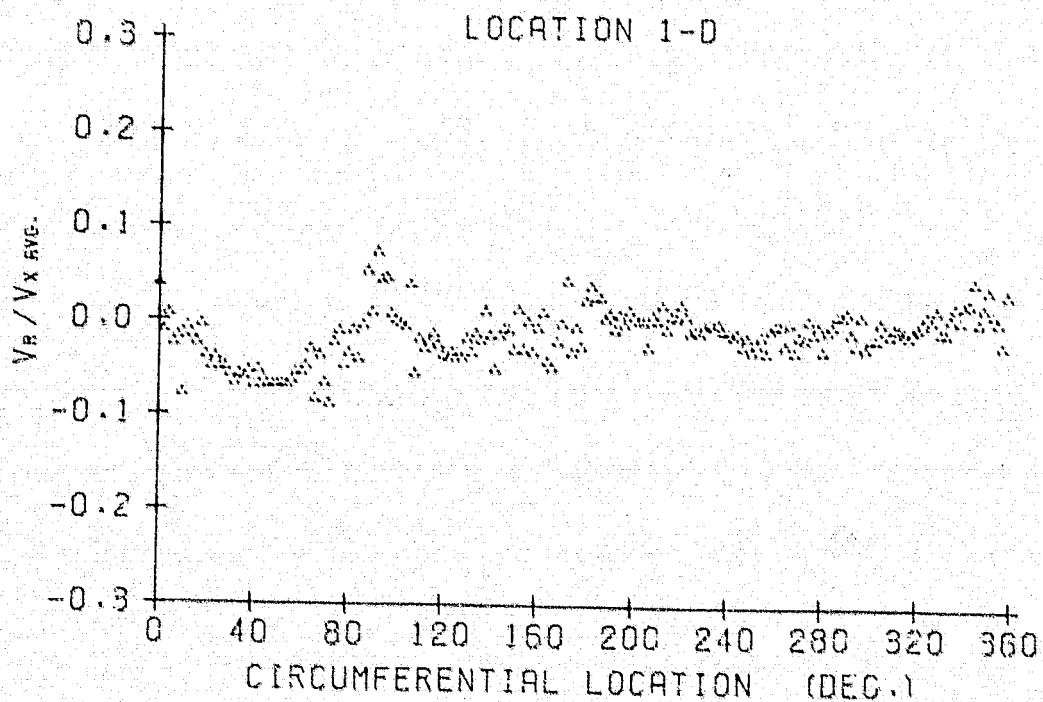
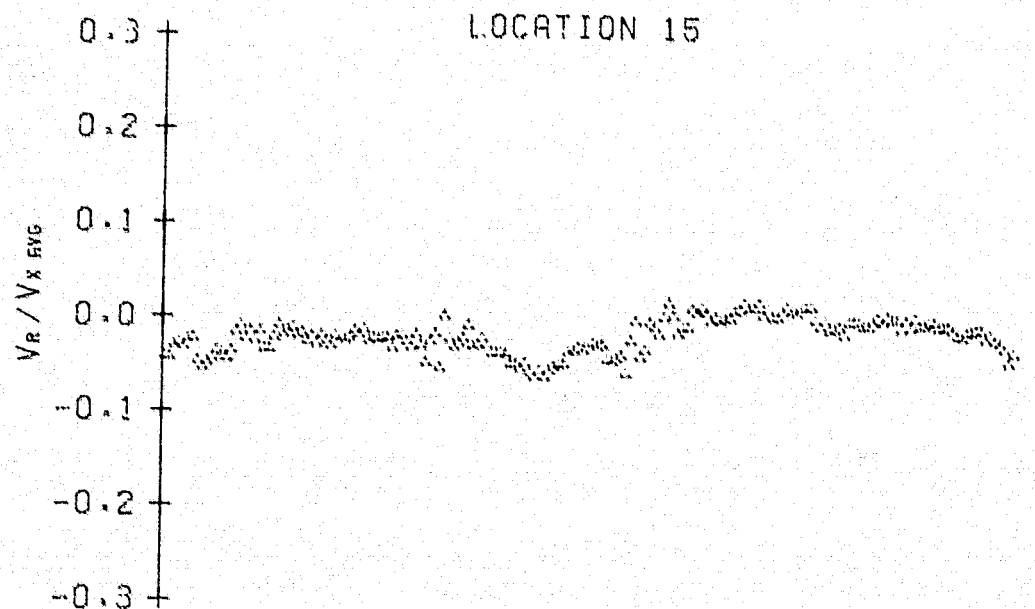


Figure G.93

9 BLADES

AVG. FLOW COEF. = 0.583

50 DEG. STAGGER ANGLE

AVG. P-RISE COEF. = 1.807

180 DEG. SQ. DISTORTION

AVG. INCIDENCE = 3.66 DEG.

RPM = 1688

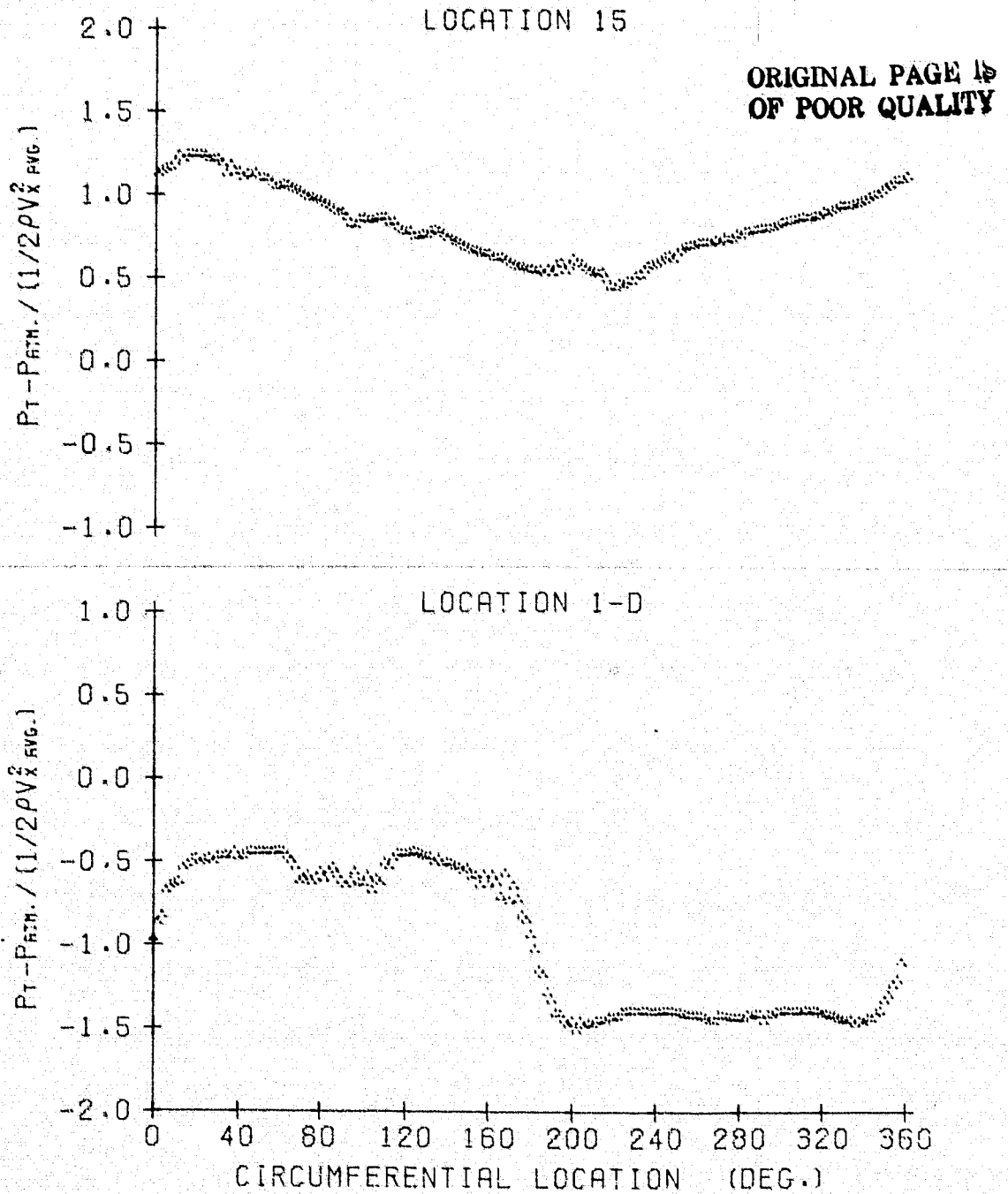


Figure G.94

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SG. DISTORTION
RPM = 1688

AVG. FLOW COEF. = 0.583
AVG. P-RISE COEF. = 1.807
AVG. INCIDENCE = 3.66 DEG.

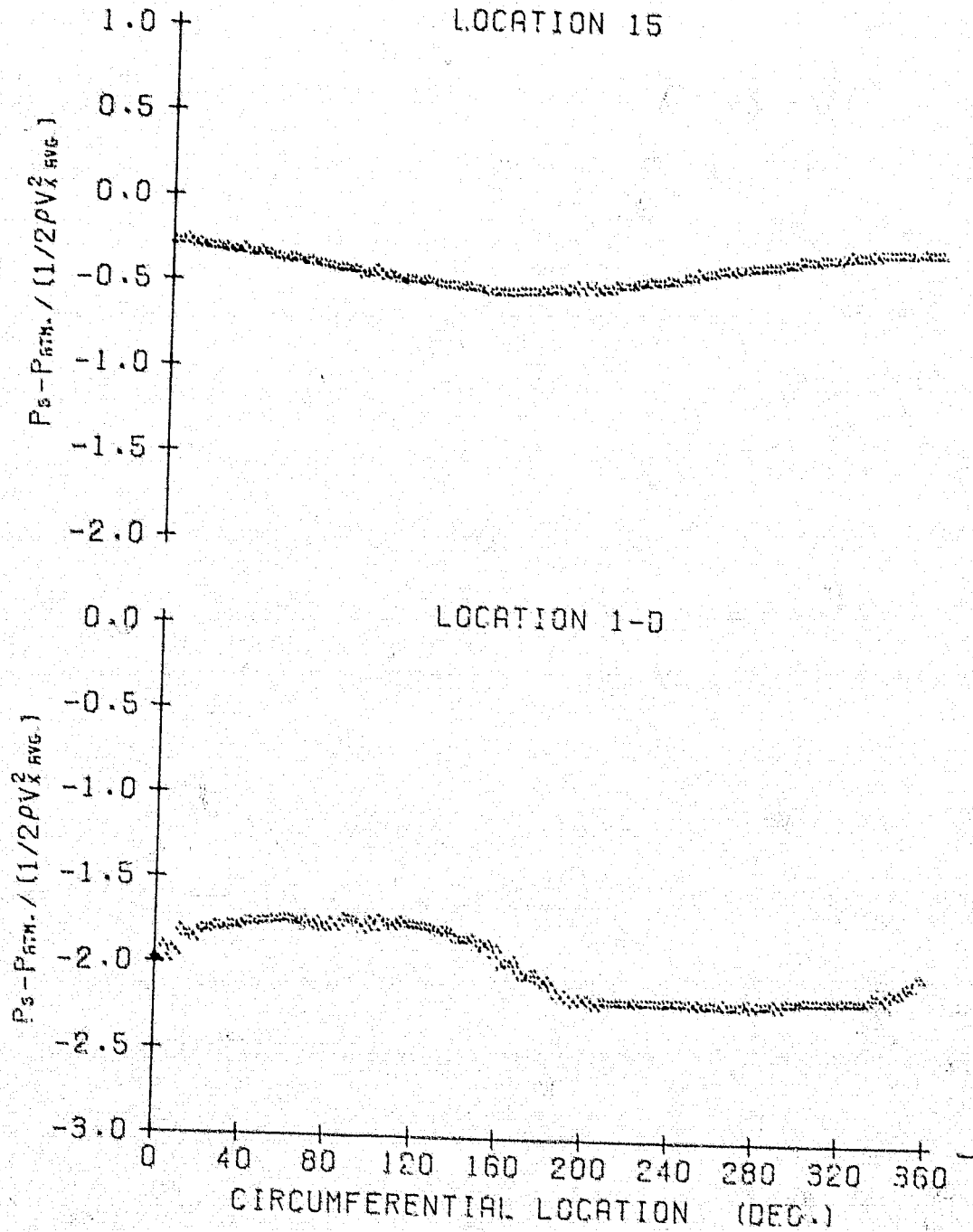


Figure G.95

10 October 1978

LCB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1688

AVG. FLOW COEF. = 0.583
AVG. P-RISE COEF. = 1.807
AVG. INCIDENCE = 3.66 DEG.

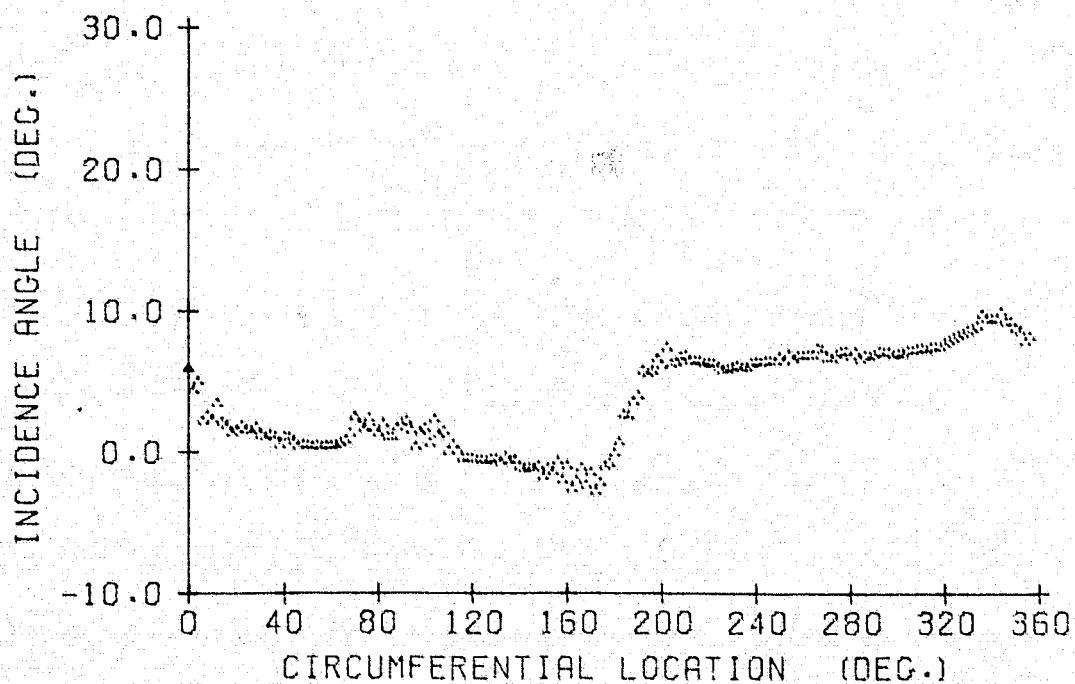


Figure G.96

10 October 1978

LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1688

AVG. FLOW COEF. = 0.528
AVG. P-RISE COEF. = 2.165
AVG. INCIDENCE = 5.95 DEG.

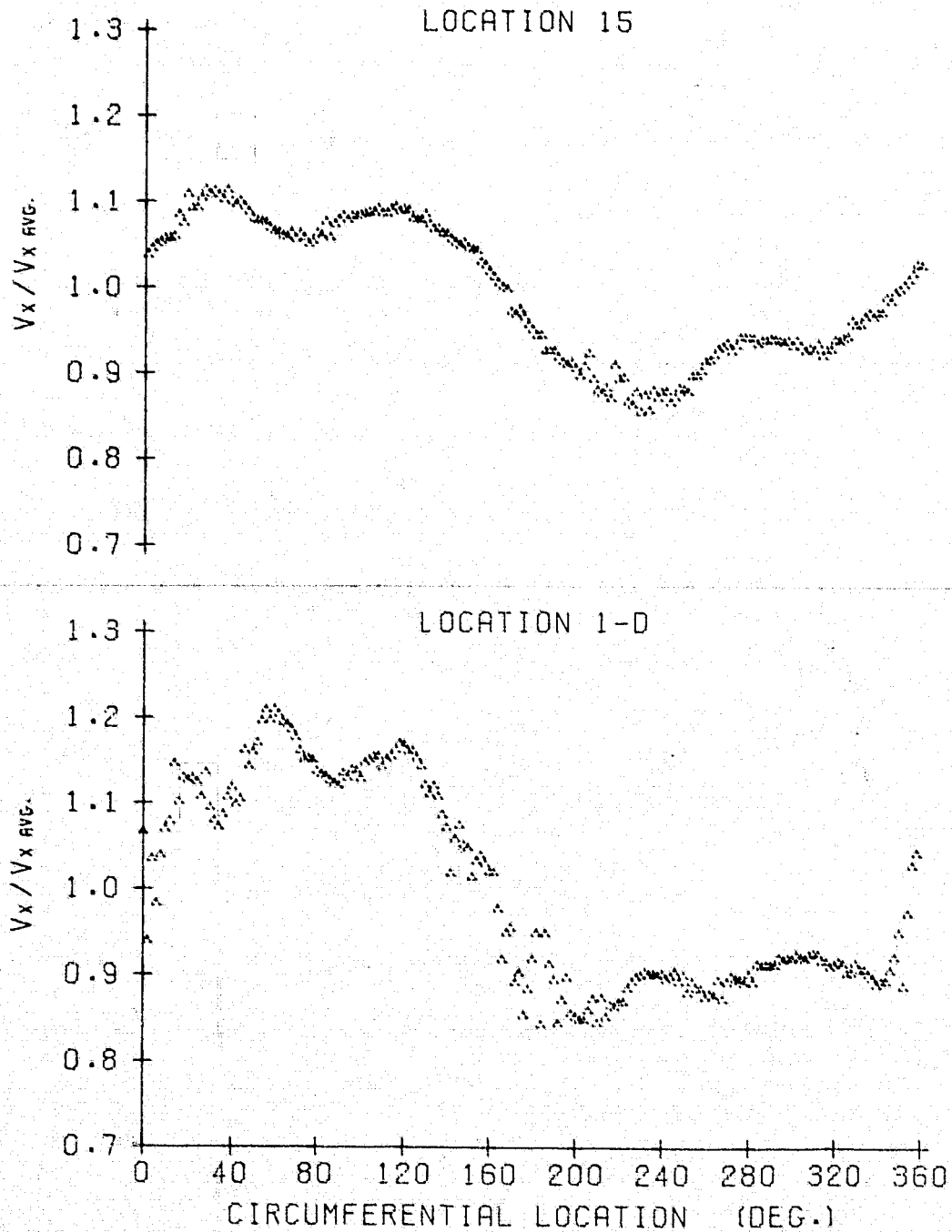


Figure G.97

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1688

AVG. FLOW COEF. = 0.528
AVG. P-RISE COEF. = 2.165
AVG. INCIDENCE = 5.95 DEG.

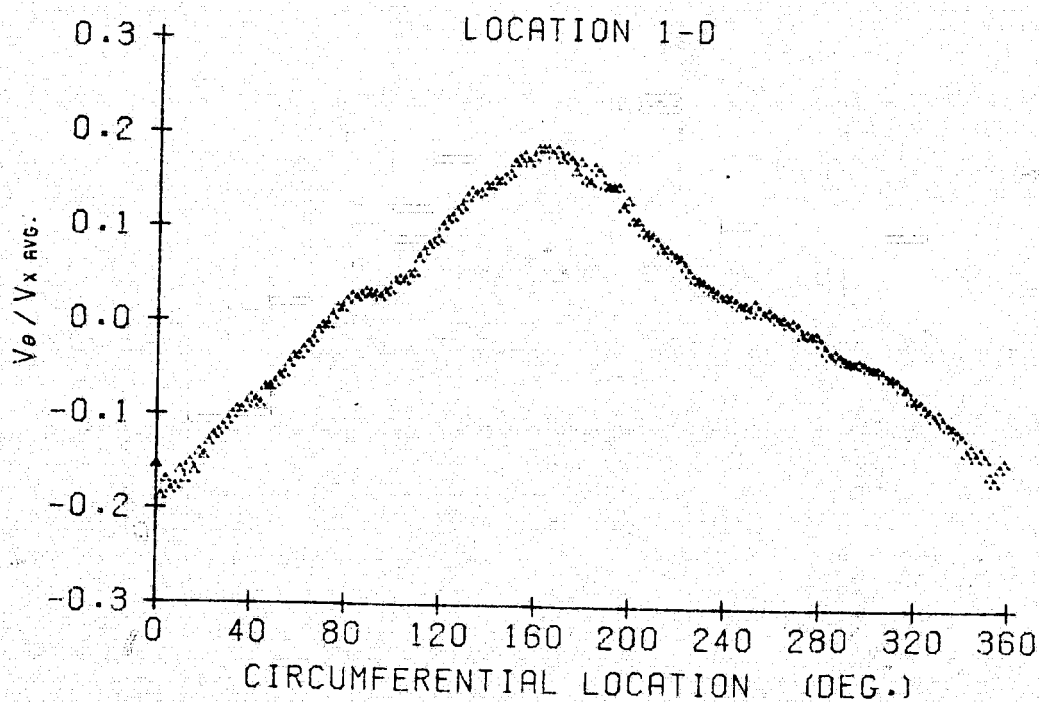
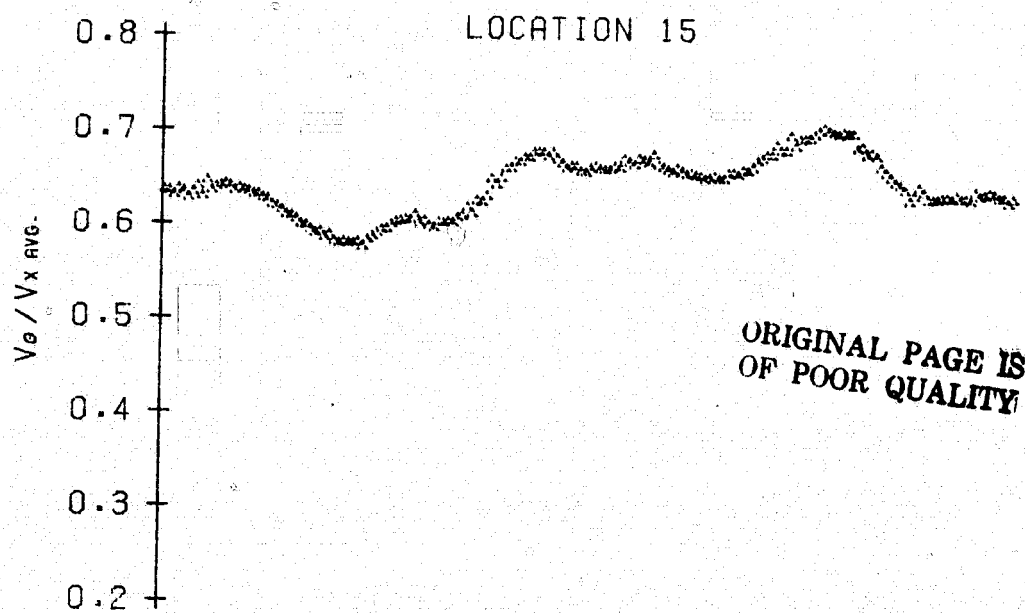


Figure G.98

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1688

AVG. FLOW COEF. = 0.528
AVG. P-RISE COEF. = 2.165
AVG. INCIDENCE = 5.95 DEG.

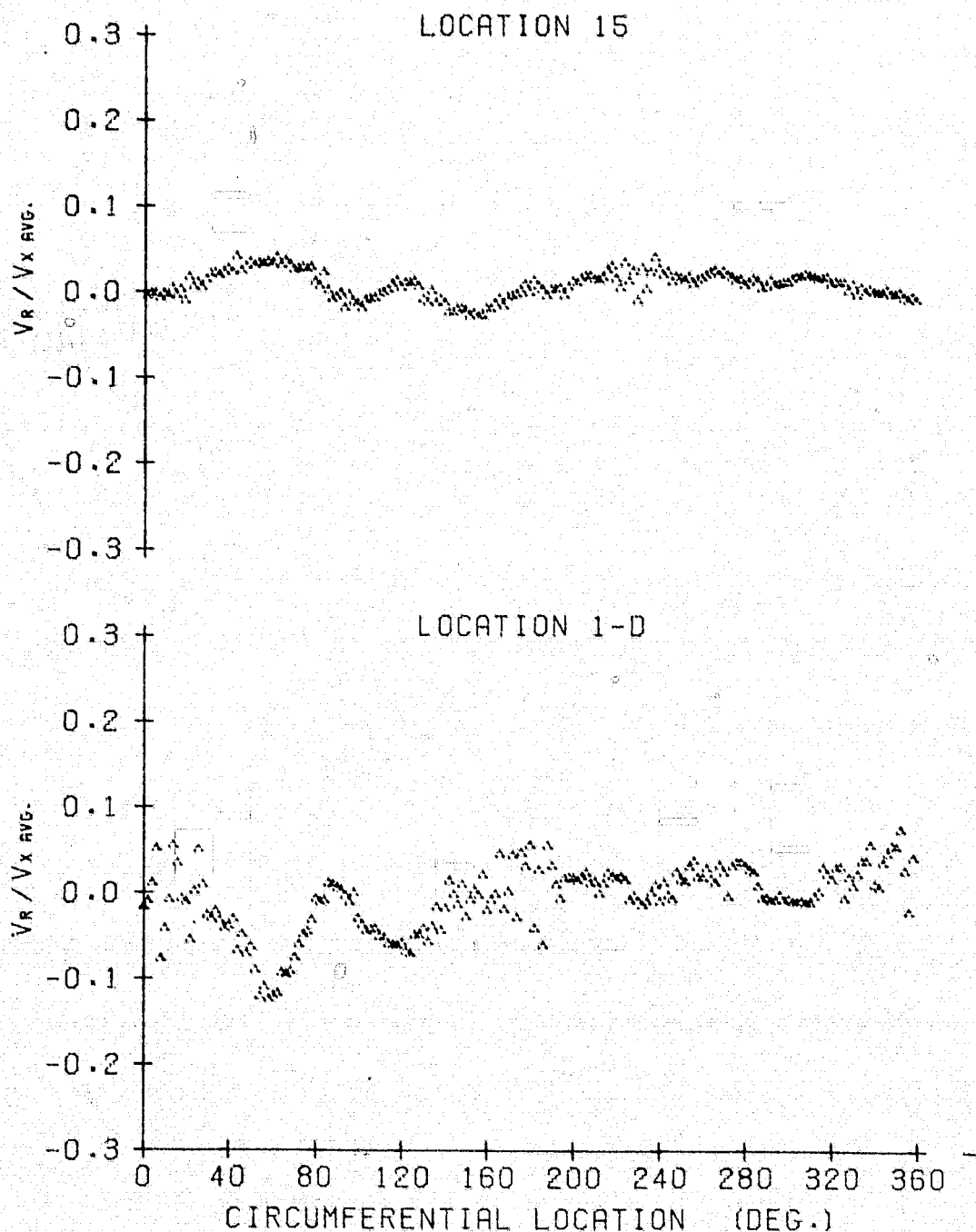


Figure G.99

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1688

AVG. FLOW COEFF. = 0.528
AVG. P-RISE COEFF. = 2.165
AVG. INCIDENCE = 5.95 DEG.

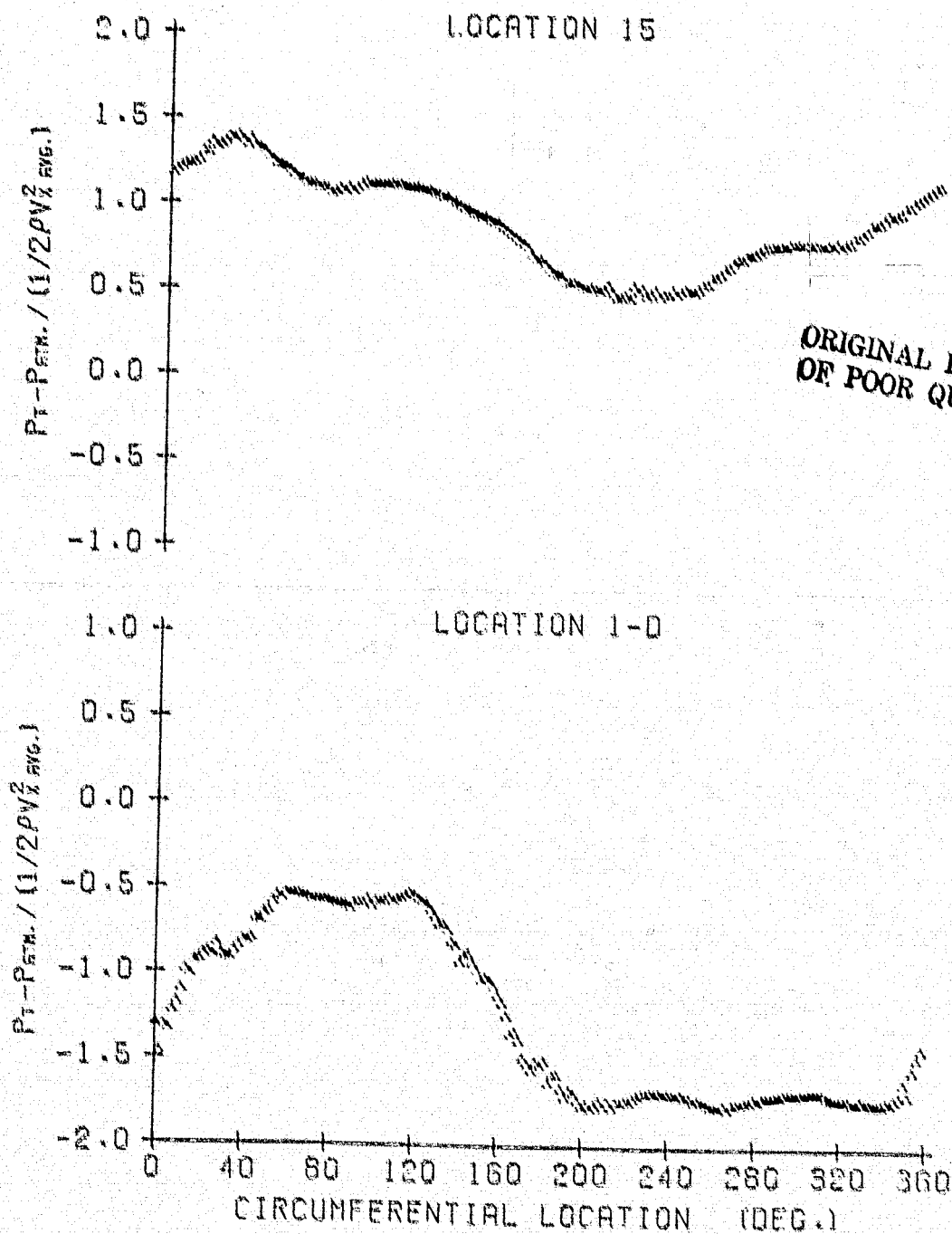


Figure G.100

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1688

AVG. FLOW COEF. = 0.528

AVG. P-RISE COEF. = 2.165

AVG. INCIDENCE = 5.95 DEG.

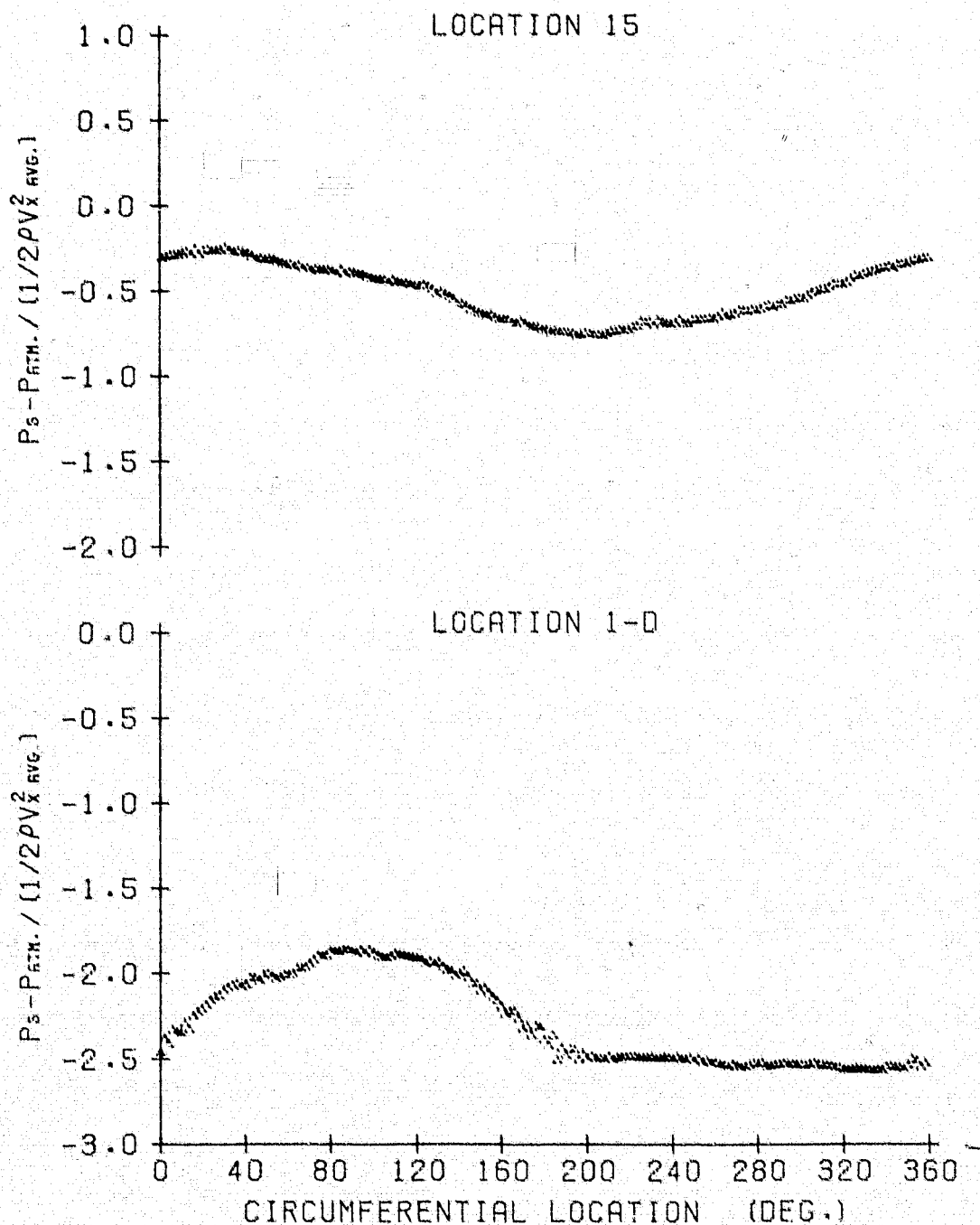


Figure G.101

10 October 1978

LCB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1688

AVG. FLOW COEF. = 0.528
AVG. P-RISE COEF. = 2.165
AVG. INCIDENCE = 5.95 DEG.

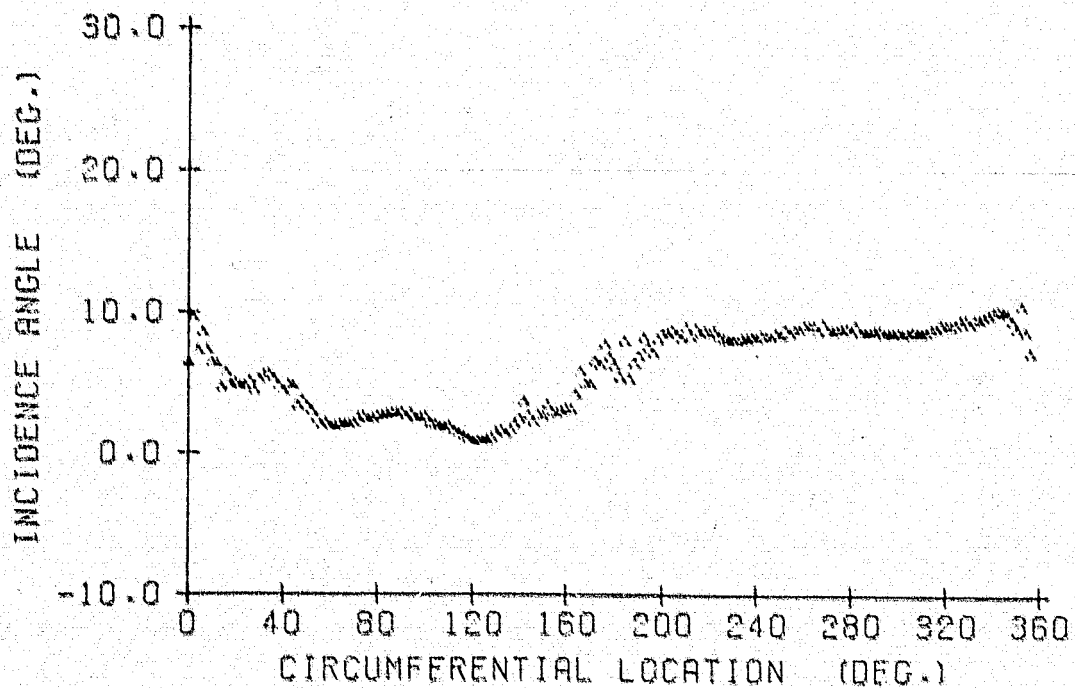


Figure G.102

10 October 1978

LCB:jep

9 BLADES
 50 DEG. STAGGER ANGLE
 180 DEG. 50. DISTORTION
 RPM = 1688

AVG. FLOW COEF. = 0.547

AVG. P-RISE COEF. = 1.949

AVG. INCIDENCE = 5.06 DEG.

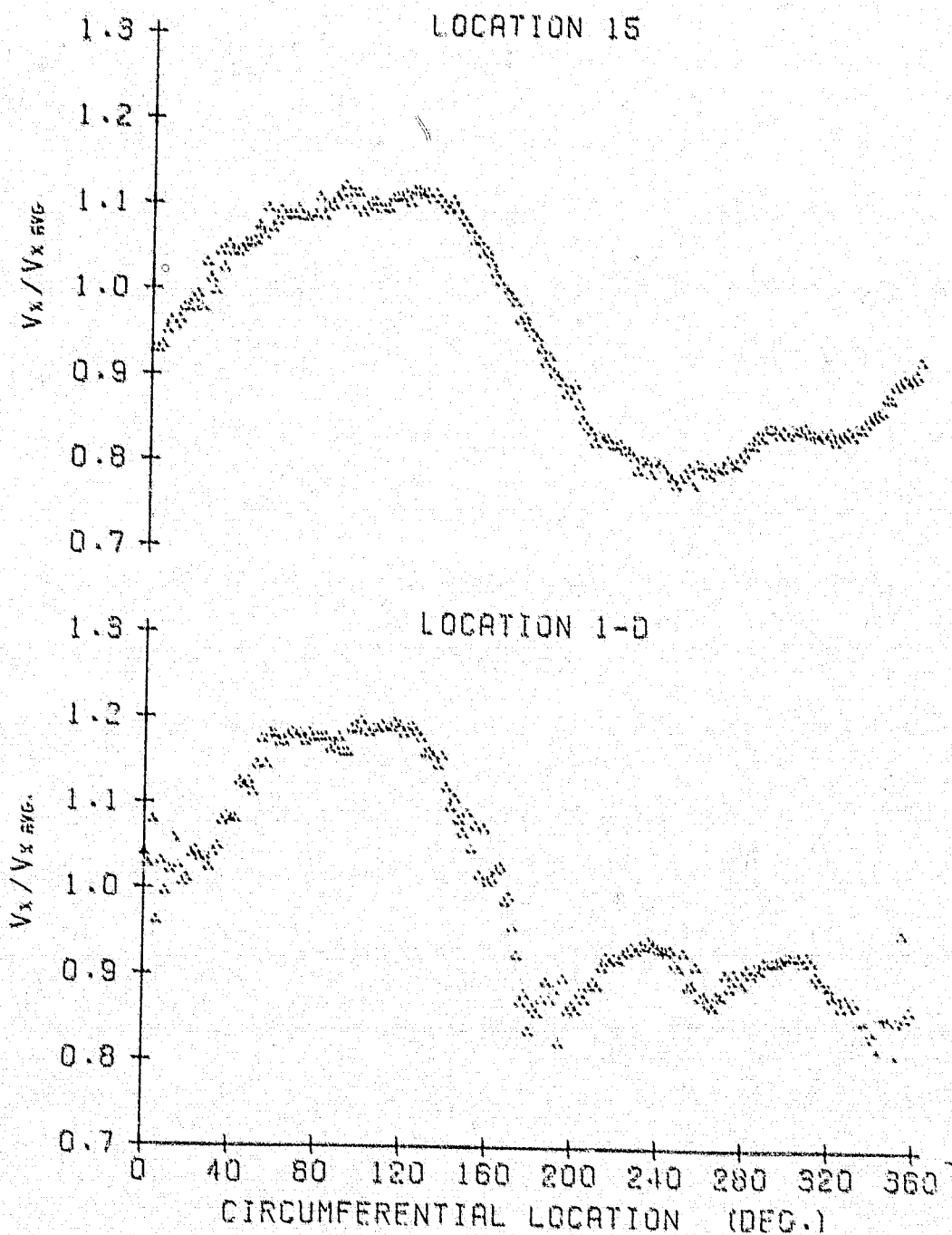


Figure G.103

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1688
AVG. FLOW COEF. = 0.547
AVG. P-RISE COEF. = 1.949
AVG. INCIDENCE = 5.06 DEG.

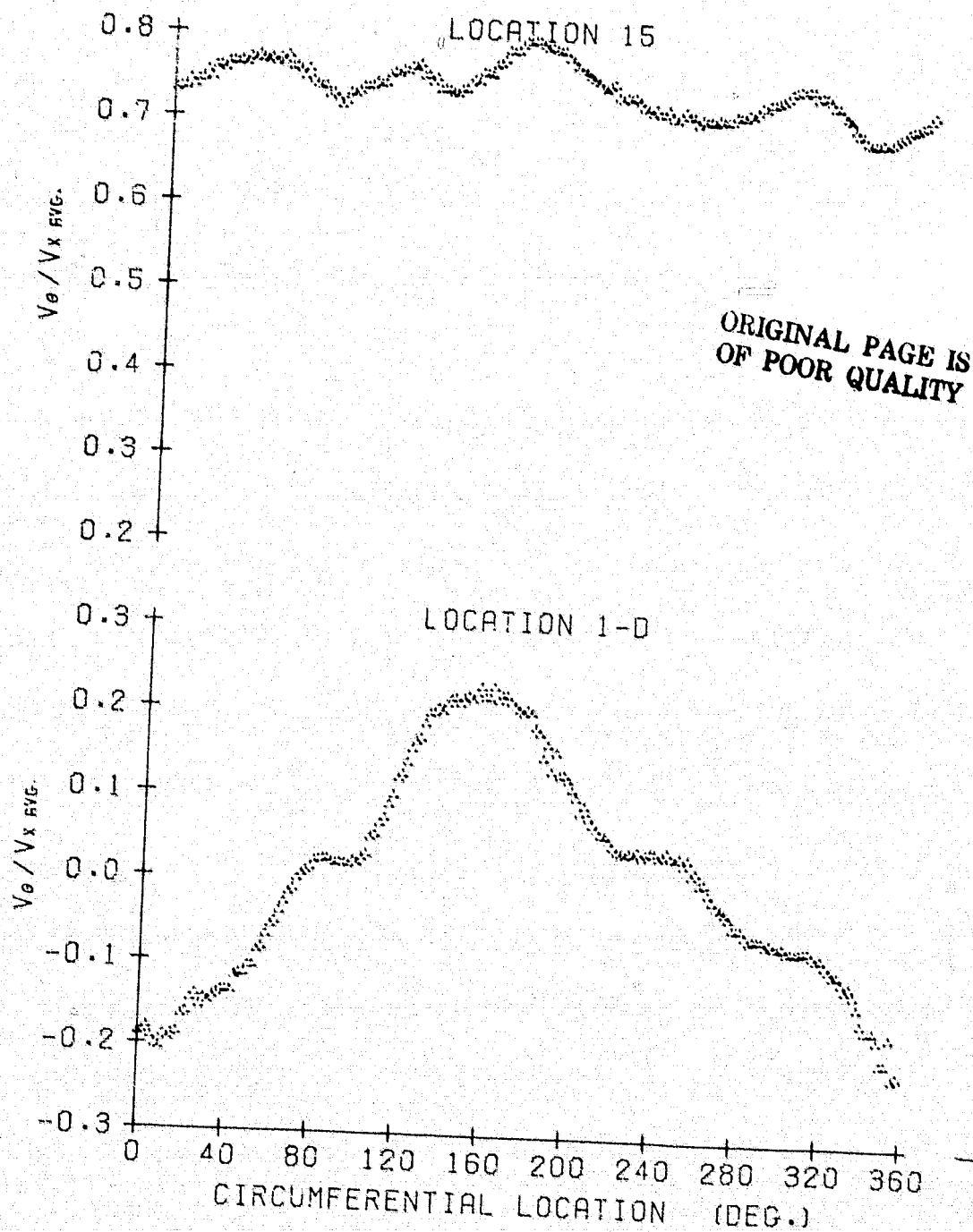


Figure G.104

-544-

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1688

AVG. FLOW COEF. = 0.547
AVG. P-RISE COEF. = 1.949
AVG. INCIDENCE = 5.06 DEG.

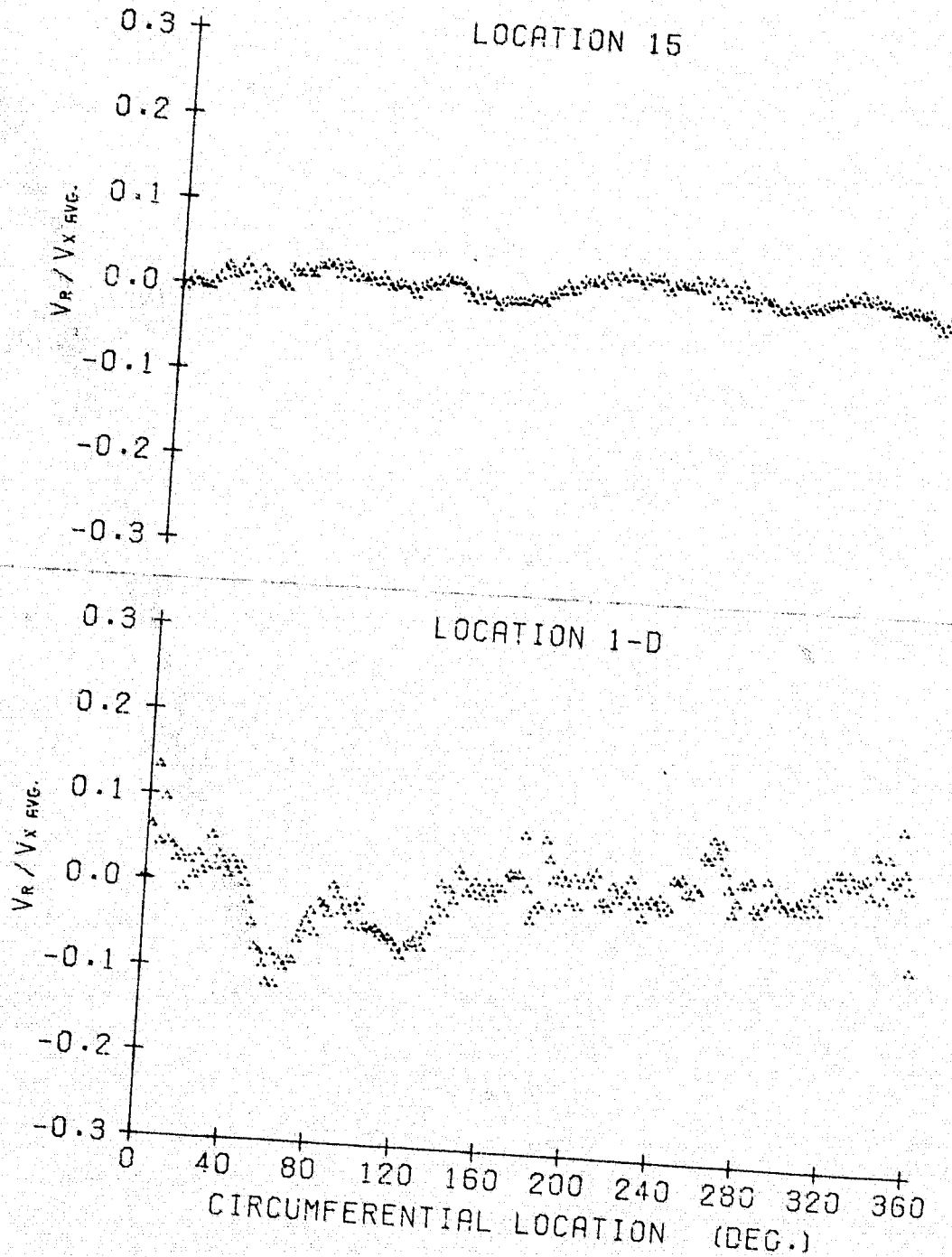


Figure G.105

10 October 1978
LCB:jep

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1688

AVG. FLOW COEF. = 0.547
AVG. P-RISE COEF. = 1.949
AVG. INCIDENCE = 5.06 DEG.

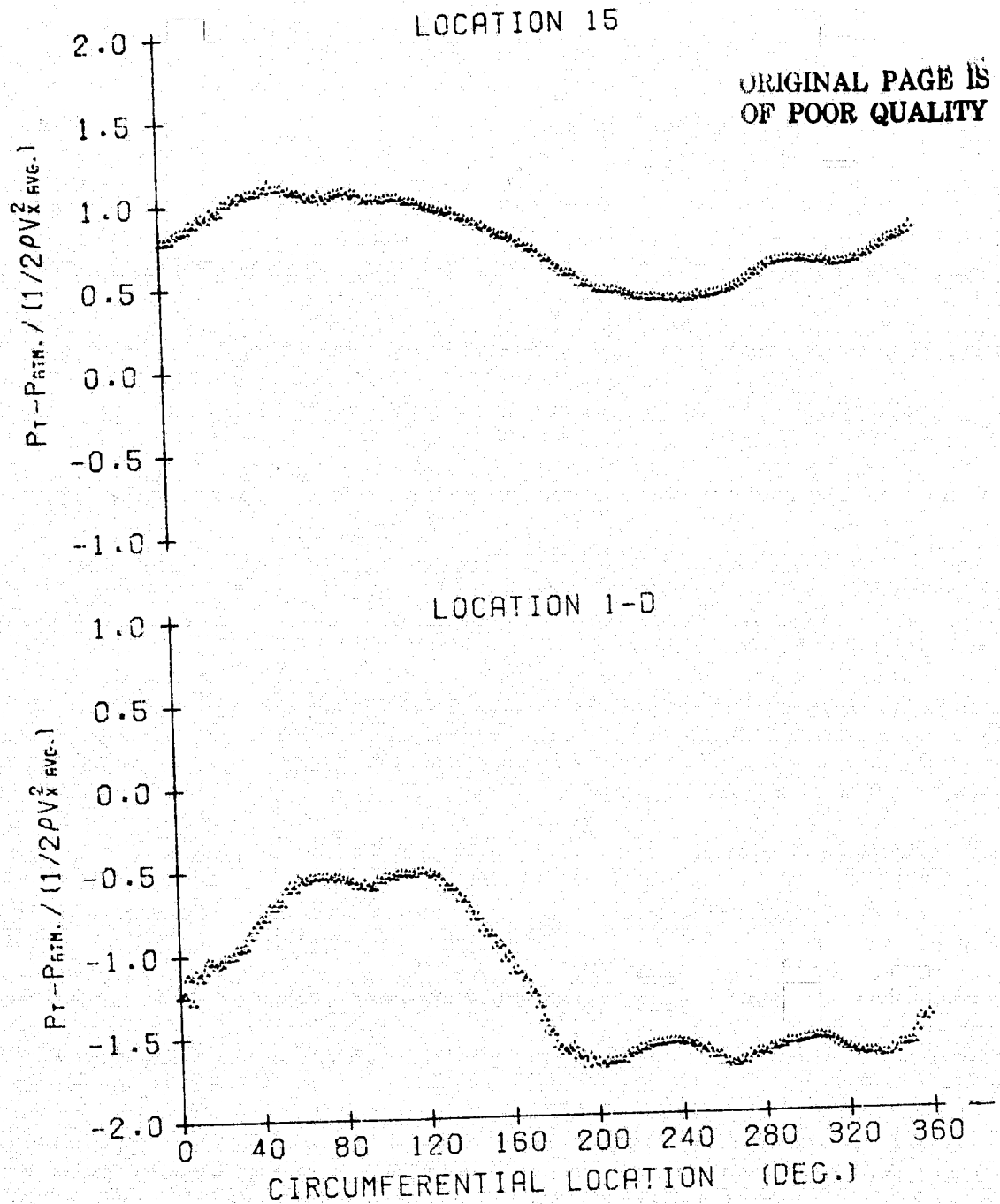


Figure G.106

9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1688

AVG. FLOW COEF. = 0.547

AVG. P-RISE COEF. = 1.949

AVG. INCIDENCE = 5.06 DEG.

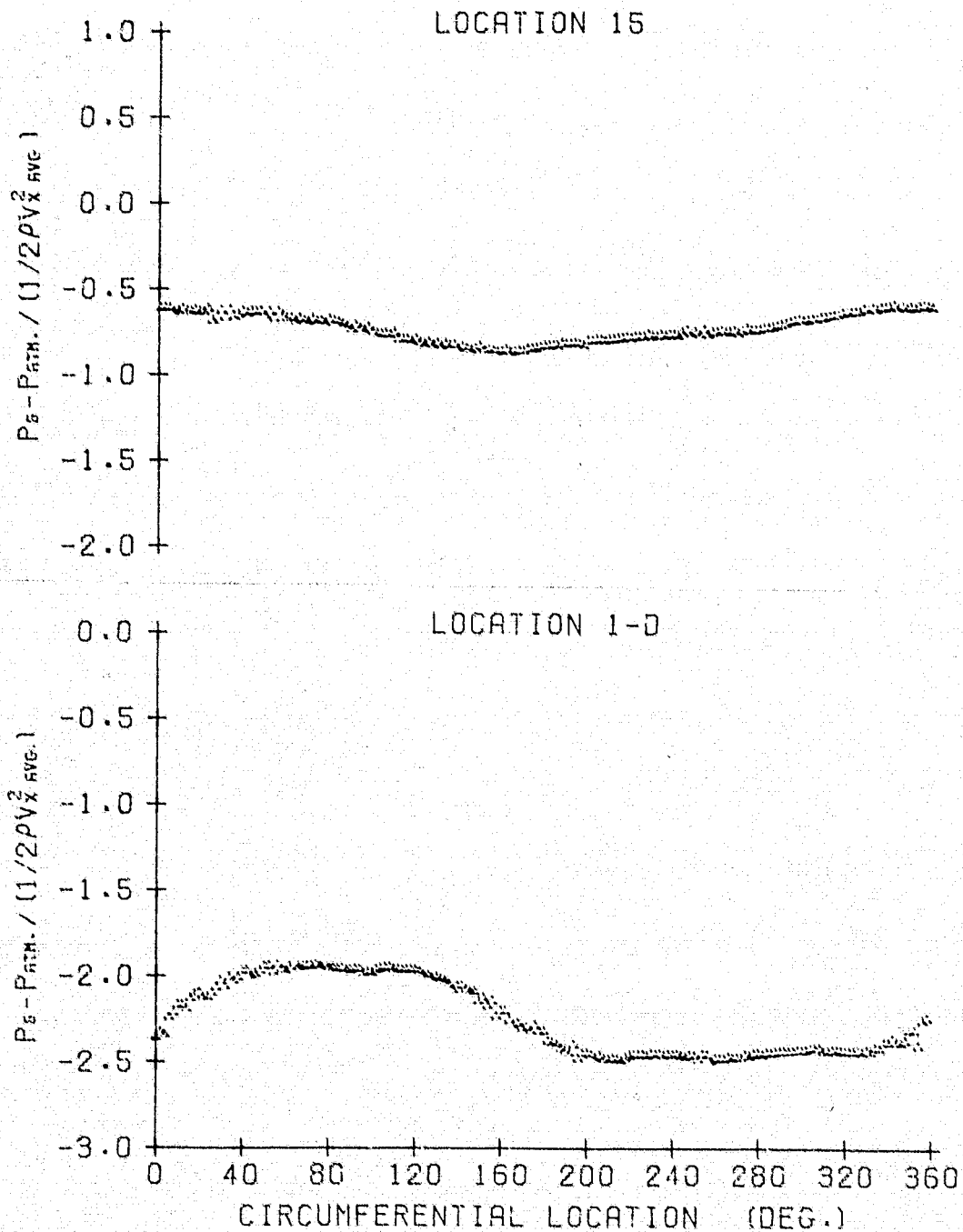


Figure G.107

10 October 1978
LCB:jep

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9 BLADES
50 DEG. STAGGER ANGLE
180 DEG. SQ. DISTORTION
RPM = 1688

AVG. FLOW COEF. = 0.547
AVG. P-RISE COEF. = 1.949
AVG. INCIDENCE = 5.06 DEG.

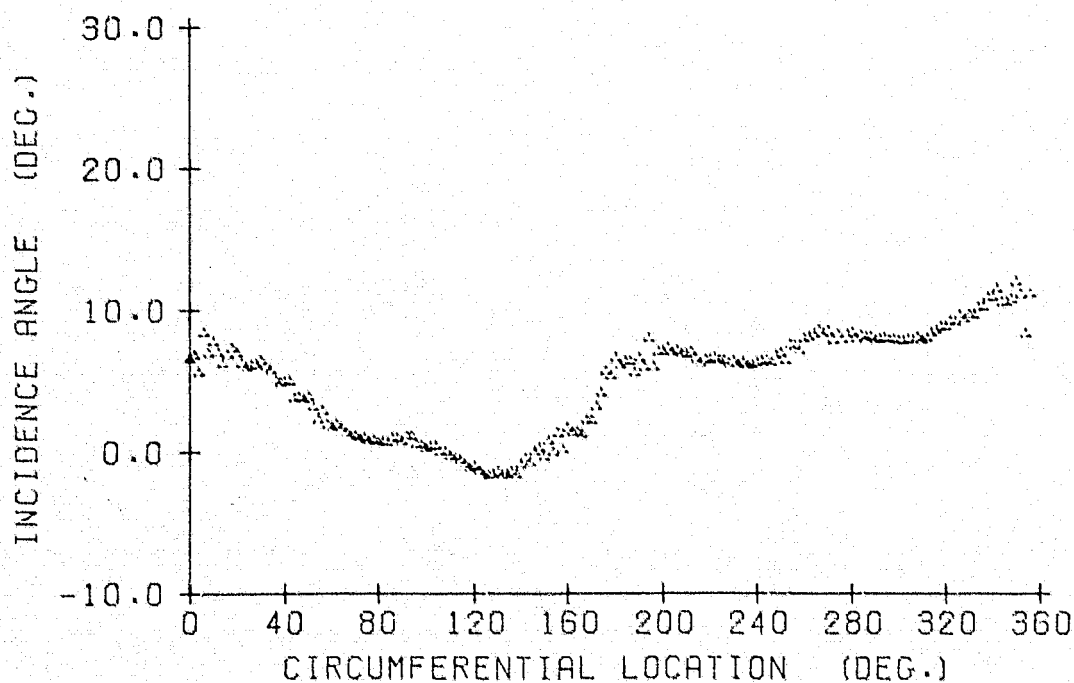


Figure G.108